EXHIBIT 3

REDACTED

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

SAN FRANCISCO DIVISION

IN RE GOOGLE PLAY STORE ANTITRUST LITIGATION THIS DOCUMENT RELATES TO: *In re Google Play Consumer Antitrust Litigation*, Case No. 3:20-cv-05761-JD	No. 3:21-md-02981-JD **CLASS CERTIFICATION REPLY REPORT OF HAL J. SINGER, PH.D.** Judge: Hon. James Donato

HIGHLY CONFIDENTIAL UNDER PROTECTIVE ORDER

INTRODUCTION AND ASSIGNMENT

1. I have been asked by counsel for Consumer Plaintiffs to respond to the expert report of Dr. Michelle Burtis ("Burtis Report").[1] As detailed below, the Burtis Report does not cause me to alter any of the opinions expressed in my class certification report ("Singer Report").[2]

2. In the Singer Report, I concluded that common methods and evidence demonstrate that, in the absence of Google's anticompetitive conduct, all or almost all Consumer Class members would have paid lower prices for Apps and In-App Content.[3] I demonstrated that Google has monopoly power in the Android App Distribution Market, gained and maintained through exclusionary contracting practices and artificial technological barriers.[4] I further demonstrated that Google has extended its power into the In-App Aftermarket by tying it to the Android App Distribution Market using the Aftermarket Restrictions.[5]

3. In the Singer Report, I used standard economic methods, data, and evidence common to the Class to show that the Challenged Conduct resulted in antitrust injury to all or almost all Class members, with aggregate damages of up to $4.73 billion for consumers nationwide across the two separate product markets.[6] I also presented an alternative model of impact and damages that can be applied to a single, combined antitrust product market, including one variation that does not calculate a take-rate reduction, but instead finds common impact through direct consumer subsidies.[7] Dr. Burtis is therefore mistaken when she claims that "Consumer Plaintiffs' claims of classwide antitrust impact depend on showing that there would be a reduction in service fees..."[8]

4. I have also been asked to respond to both Dr. Burtis's and Dr. Michael Williams's analysis of pass-through.[9] The pass-through analyses of Drs. Burtis and Williams are unreliable and biased, and they are virtually guaranteed to underestimate pass-through in a competitive but-for world with steering and discounting—conditions that were absent in their "natural experiments." Although their pass-through analyses suffer from numerous methodological flaws that render both of their analyses unreliable and uninformative, it bears emphasis that no "corrections" to their methods could produce reliable pass-through estimates, given (1) the limitations that Google placed on a developer adjusting its prices, (2) the lack of any incentive to rebate prices to renewing

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1. Expert Report of Dr. Michelle M. Burtis (March 31, 2022) [hereafter, Burtis Report].
2. Expert Report of Hal J. Singer, Ph.D. (February 28, 2022) [hereafter, Singer Report]. Unless otherwise defined, capitalized terms herein are defined the same as they are in the Singer Report. The materials I relied upon in forming my opinions are noted in the footnotes throughout this report or otherwise listed in Appendix 1, or in the Singer Report. I reserve the right to supplement, expand, or amend my opinions.
3. *Id.* ¶2. I also concluded that Consumer Plaintiffs would also have benefitted from enhancements to output, quality, and consumer choice in a more competitive but-for world. *Id.*
4. *Id.* Dr. Burtis accepts for purposes of her analysis that "the alleged relevant antitrust markets are properly defined," that "Google Play had market power in the[] claimed relevant markets," and that "in the but-for world, Google Play would face more competition." Burtis Report ¶¶42-44.
5. Singer Report ¶2.
6. *Id.* ¶274.
7. *Id.* ¶¶245-256.
8. Burtis Report ¶11.
9. *Id.* ¶¶173-178; ¶¶280-295; Expert Report of Michael Williams (February 28, 2022) [hereafter, Williams Report] ¶¶76-88; ¶¶111-124. Dr. Williams is one of the economic experts for the Developer Class.

subscribers, and (3) that no data exist to directly measure pass-through in the absence of the Challenged Conduct, which remains in place to this day.[10] In addition, classwide impact does not depend on pass-through in my economic model that finds common impact through direct consumer subsidies.[11] Dr. Burtis's and Dr. Williams's pass-through analyses are irrelevant to that model, which itself supports class certification in this case.

QUALIFICATIONS

5. My qualifications are detailed in the Singer Report. Since that time, I have testified before the House Economic Disparity and Fairness in Growth Committee on April 6, 2022, regarding the linkages between concentration and consumer harms.[12]

I. DR. BURTIS'S ATTEMPTS TO REFUTE COMMON IMPACT ARE WITHOUT MERIT

6. This section responds to Part VI of the Burtis Report. Sub-section A responds to Dr. Burtis's arguments in her Part VI.A, sub-section B responds to Dr. Burtis's arguments in her Part VI.B, and so on.

A. Google Would Have Offered Lower Take Rates To All or Almost All Developers in a More Competitive But-For World

7. In Part VI.A of the Burtis Report, Dr. Burtis claims there is no common proof of a "Uniform Lower Service Fee" in the but-for world. My analysis does not *assume* a uniform take rate across all developers in a more competitive but-for world, but instead *solves* for a but-for *headline* rate that applies to almost all developers, which tracks Google's standardized pricing in the actual world. As explained in the Singer Report, Google did offer limited discounts to the headline rate of 30 percent for an exceedingly small share of developers. However, even for these developers, the take rate net of any discounts would have been lower in the but-for world because the discounts would have been negotiated from a lower headline rate, not the inflated 30 percent headline rate.[13] Therefore, in the but-for world, it is reasonable to assume that those developers that secured discounts off the inflated rate of 30 percent would have also secured the discounts off a lower, headline rate. My model determines the headline rate that would have prevailed in a more competitive but-for world, and implies antitrust impact to the small fraction of developers that obtained a discount off the headline rate.

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10. *See* Part IV, *infra*.
11. Singer Report ¶¶245-256.
12. "(Im)Balance of Power: How Market Concentration Affects Worker Compensation and Consumer Prices," Testimony to the House Committee on Economic Disparity and Fairness in Growth, Apr. 6, 2022.
13. Singer Report ¶177, n. 376; *see also* Singer Report Part VII (demonstrating how damages can be calculated for individual Class Members using common methods, taking into account the fact that a limited number of developers received discounts relative to Google's standard 30 percent take rate).

1. Limited Variation Within the Play Store's Highly Uniform and Formulaic Take Rate Structure Does Not Refute Classwide Impact

8. In Part VI.A.1 of the Burtis Report, Dr. Burtis claims that take-rate reductions would be individualized in a more competitive but-for world.[14] The Play Store's take rate structure is highly uniform and formulaic. Dr. Burtis emphasizes limited exceptions for special programs such as [redacted][15] But only [redacted] of the proposed developer class qualified for any of these special programs.[16] And within each of these special programs, the take rate remained highly formulaic—set equal to a fixed percentage-point discount off the headline take rate of 30 percent.

9. For the duration of the Class Period, the Play Store has charged a headline take rate of 30 percent to the vast majority of developers.[17] Starting in 2018, Google implemented limited, formulaic, non-individualized take rate reductions. In 2018, Google reduced take rates from 30 to 15 percent for developers whose customers maintained a subscription service for twelve or more continuous months; the take rate for the first twelve months on subscriptions remained at the headline rate of 30 percent. Starting in January 2022, Google reduced the take rate to 15 percent for all subscription developers, even for the initial twelve months.[18] Google applied the same common formula to all or almost all subscription developers.[19] In mid-2021, Google reduced the take rate to 15 percent for the first $1 million in annual revenue for all developers in the Play Store, again applying a common formula.[20]

10. It is not reasonable to presume, as Dr. Burtis does, that Google would alter its pricing policy and start negotiating take rates on an individualized basis with tens of thousands of developers

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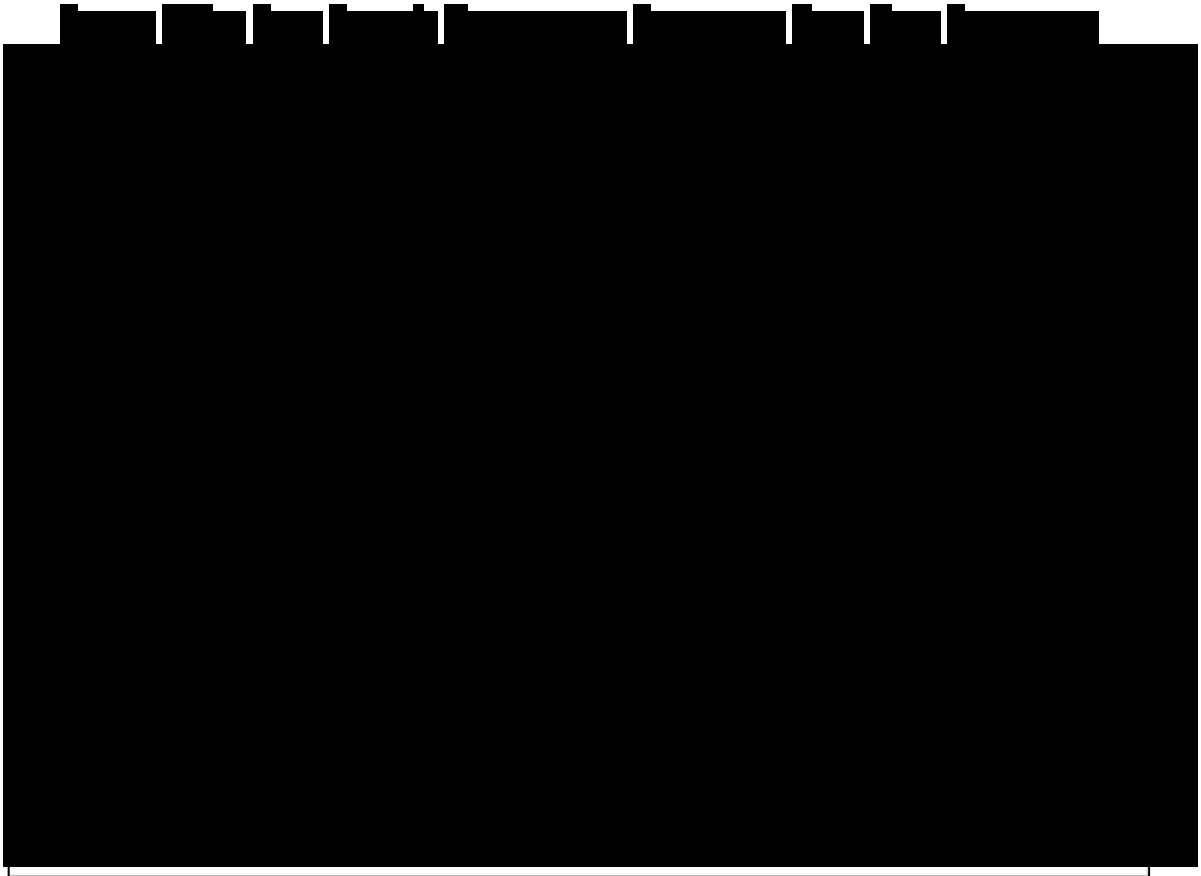
14. Burtis Report ¶113.
15. *Id.* ¶114.
16. There are "at least [redacted] U.S. developers" in the developer class. Burtis Report ¶74. There are [redacted]
17. *See, e.g.,* GOOG-PLAY-000443763, at -772 ([redacted].
18. Sameer Samat (Google Vice President, Product Management), *Evolving our business model to address developer needs* (Oct. 21, 2021), *available at* https://android-developers.googleblog.com/2021/10/evolving-business-model.html ("starting on January 1, 2022, we're decreasing the service fee for all subscriptions on Google Play from 30% to 15%, starting from day one.")
19. [redacted]
20. Sameer Samat (Google Vice President, Product Management), *Boosting developer success on Google Play* (Mar. 16, 2021), *available at* https://android-developers.googleblog.com/2021/03/boosting-dev-success html ("Starting on July 1, 2021 we are reducing the service fee Google Play receives when a developer sells digital goods or services to 15% for the first $1M (USD) of revenue every developer earns each year. With this change, 99% of developers globally that sell digital goods and services with Play will see a 50% reduction in fees.").

in a more competitive but-for world.[21]



Note:

Singer Report ¶154.

21.

Singer Report ¶¶110-114; ¶¶121-127.

Notes: Figures may not sum to 100 percent due to rounding.

Singer Report ¶193, n. 392.

11. Dr. Burtis claims that, because entry by competing app stores such as the ONE Store and the Epic Games Store did not cause Google to lower its take rate in the actual world, this demonstrates that all or almost all Class members would not have benefitted from lower take rates in a more competitive but-for world.[22] Yet Google *did* respond to the (limited) competition offered by the ONE Store by expanding subsidies available to all consumers via its Play Points program in South Korea.[23] As Dr. Burtis concedes, "Google Play Points are available, without cost, to any consumer that registers to receive Play Points."[24] And the Epic Games Store was not even available on Android devices (only on PC and Mac), as Dr. Burtis concedes.[25] That Google has not responded

22. Burtis Report ¶¶128-129.
23. Singer Report ¶248.
24. Burtis Report ¶353.
25. *Id*. ¶129; *see also* Epic Games Store, *FAQ*, *available at* https://www.epicgames.com/site/en-US/epic-games-store-faq ("Which Platforms does the Epic Games Store Support? The Epic Games Store currently offers PC and Mac support.") (last updated Aug. 18, 2021).

further to competition from competing app stores is indicative of the lack of full-fledged competition in the actual world.[26]

12. Dr. Burtis claims that, because competing app stores such as those operated by [redacted] this demonstrates that individualized inquiry would be necessary to determine whether all or almost all developers would have benefitted from lower take rates in the but-for world.[27] But she concedes that Samsung offered a formulaic "tiered structure," with take rates of either 30 percent or 20 percent for "premier partners."[28] That competing app stores agreed to lower take rates for exceptionally popular developers such as Epic provides no basis to presume, as Dr. Burtis does, that competing app stores would negotiate take rates on an individualized basis with tens of thousands of developers in a more competitive but-for world. More importantly, [redacted] did not amount to meaningful competition in light of the Challenged Conduct, as explained in the Singer Report.[29] That Google did not drop its take rate in response to this weak entry does not inform how Google would have responded to vibrant entry in the but-for world with steering and discounting.

2. Developers at Low Price Points Would Still Benefit from Increased Competition in a More Competitive But-For World and Would Not Pay Higher Payment Processing Costs as a Percentage of the Transaction

13. This section responds to Part VI.A.2 of the Burtis Report, in which Dr. Burtis claims that developers with low price points ($0.99 per download) would not have benefitted from increased competition because payment processors such as PayPal currently impose a per-transaction fee of up to $0.49, resulting in payment processing fees in excess of 50 percent for developers charging $0.99.[30] Dr. Burtis also claims these per-transaction fees would result in take rates in excess of 27 percent for developers charging $1.99.[31] It bears noting that the 27 percent implied rate is *below* what Google charged for most of the Class Period, indicating that these developers suffered antitrust injury, even if one accepts Dr. Burtis's assumption that a per-transaction fee would persist in the but-for world.

14. Dr. Burtis's claim that the competitive rate for payment processing would range from 27 to 50 percent wholly ignores the realities of current pricing of transactions for paid Apps and In-App Content. Google obviously does not incur a per-transaction fee of $0.49 each time it processes

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26. *See, e.g.*, GOOG-PLAY-000005203.R at GOOG-PLAY-000005221.R ([redacted]); GOOG-PLAY-000292207.R at GOOG-PLAY-000292223.R ([redacted]).
27. Burtis Report ¶¶119-121.
28. *Id.* ¶120. With respect to [redacted], the document cited in the Burtis Report (¶119, n. 32) shows that [redacted] *See* GOOG-PLAY-000568027.R at 028.R ("[redacted]").
29. *See* Singer Report Part III.D.2.c ([redacted]; *see also* Part III.D.2.b ([redacted]).
30. Burtis Report ¶¶131-132.
31. *Id.*

a $0.99 transaction for a developer (if it did, it would lose money on these developers). Record evidence indicates [redacted] serve $0.99 developers while charging much lower take rates than the 52 percent payment processing costs that Dr. Burtis claims developers would incur in a more competitive but-for world.[33] Google and other app stores achieve economies of scale in payment processing by aggregating transactions from a large number of developers—economies that have been denied to payment processors in part due to the Challenged Conduct. In a more competitive but-for world, absent the Aftermarket Restrictions, competing payment processors would gain a foothold in the In-App Aftermarket and enjoy these economies of scale and, if they wanted to win the business of apps pricing at $0.99, economics predicts that they would eschew minimum fees—indeed, this competitive process has already begun to unfold in the Apple App Store, as explained below.

15. In Table 4 of her report, Dr. Burtis lists *some* of the fee structures that payment processors currently advertise in distinct markets and claims that developers transacting at low prices such as $0.99 would be made worse off under these rate structures, paying take rates in excess of even Google's 30 percent.[34] Dr. Burtis speculates that "a developer with a $0.99 price that used PayPal would pay $0.49 plus 2.59% of the price. The total cost is $0.52 or 52% of the value of the transaction – substantially higher than Google Play's 30% (or 15%) rate."[35] But Dr. Burtis fails to disclose that the same payment processors she cites offer "micropayment" fee structures specifically tailored to small-dollar transactions—another fact she ignores in her analysis. For example, PayPal has long advertised and offered micropayment rates of five percent plus a fixed fee of $0.05.[36] For a $1 transaction, the payment processing fee would come to just ten percent—far below Google's 30 percent take rate, let alone the rates in excess of 50 percent that Dr. Burtis puts forward.[37] Thus, Dr. Burtis's speculation that "developers that rely primarily on low priced app transactions" would

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32. *See, e.g.*, GOOG-PLAY-001556407 at -409 [redacted] *See also* GOOG-PLAY-007879368.C at GOOG-PLAY-007879369.C

33. Burtis Report ¶132.

34. *Id.*

35. *Id.*

36. *See* Paypal Help Center, *How can I update my payment preferences for micropayments?*, *available at* https://www.paypal.com/gf/smarthelp/article/how-can-i-update-my-payment-preferences-for-micropayments-faq1691 ("Our micropayment pricing is designed for PayPal Business or PayPal Premier customers who process transactions that are typically under $12 USD. As long as you have a Business or Premier PayPal account, you can enjoy these rates. To update or apply for the micropayments pricing, give us a call by clicking Help at the top of the page and we will assist you further. Our micropayment rate is 5% (6% for crossborder transactions) + $0.05 USD per transaction."); GOOG-PLAY-008162331 (2021 Google spreadsheet showing Paypal micropayment rate of $0.05 plus 5%). As of August 2, 2021, it appears that Paypal has increased its Micropayments fee to $0.09 plus 4.99%. *See* PayPal Fee Changes, (Aug. 2, 2021), *available at* https://www.paypalobjects.com/marketing/ua/pdf/US/en/feepages-080221.pdf. Even at this rate, an effective rate of 14 percent for a $0.99 transaction (equal to $0.09 + $0.99 x 0.0499) is well below Dr. Burtis's estimates.

37. Burtis Report ¶132.

be forced to rely on "more expensive"[38] payment processors in a more competitive but-for world is wrong, and is contradicted by evidence in the actual world.

16. Dr. Burtis's error becomes even more apparent when evaluating the aftermath of the recent *Epic v. Apple* ruling that Apple must permit app developers to steer consumers to other payment processing systems. Following this decision, the third-party payment processing firm Paddle announced its pricing structure for Apple's App Store.[39] In addition to providing a suite of merchant services that Apple does not, Paddle offers a ten percent take rate for any transactions under $10, and a five percent take rate plus $0.50 for transactions over this amount.[40] As shown below, if Paddle were to provide the same services to developers on the Play Store at such rates, developers selling low-priced Apps (below $10) would be unequivocally better off, as they would pay only a ten percent transaction fee with no fixed component:

TABLE 1: TAKE RATES FOR APPLE APP STORE, THE PLAY STORE, AND PADDLE

	App Store	**Play Store**	**Paddle**
Transactions below $10	15-30%	15-30%	10%
Transactions from $10+	15-30%	15-30%	5% + $0.50

Source: https://www.paddle.com/platform/in-app-purchase

Indeed, even for App prices above $10, developers would be better off under Paddle (5 percent plus $0.50) than paying the lowest take rate from Google (15 percent). For example, the lowest fee for an App priced at $10.00 on the Play Store would be $1.50, whereas the fee on the same App prices at $10.00 on Paddle would be $1.00 (equal to $0.50 plus $0.50). The disparities increase with increase in the price of the App—the Play Store is always more expensive than Paddle.

17. Dr. Burtis claims that "a developer that opted out of Google Play Billing would additionally have to incur costs for the other services that Google provides, such as customer service, subscription management, and management of billing disputes."[41] In fact, Paddle already includes such features, plus many others, in its fee structure.[42]

18. The uniformity of Paddle's rate structure also undermines Dr. Burtis's claim that individualized inquiry would be necessary to determine whether developers would be better off in a more competitive but-for world: Paddle offers the same rate structure to all developers. Individualized inquiry is also not necessary to arrive at the sound economic conclusion that developers would rationally select a lower-cost payment processor, other things equal.

19. Further, Dr. Burtis ignores that not every developer has to switch to a competing payment processor to benefit in a more competitive but-for world. Indeed, my analysis conservatively assumes that only 40 percent would switch, leaving 60 percent of the In-App

38. *Id.* ¶131.
39. Chance Miller, Paddle unveils 'first alternative' to Apple's App Store In-App Purchase system following Epic ruling, 9TO5MAC, (Oct. 7, 2021), *available at* https://9to5mac.com/2021/10/07/app-store-iap-paddle-system-announcement/.
40. In-App Purchase, Paddle, *available at* https://www.paddle.com/platform/in-app-purchase.
41. Burtis Report ¶133.
42. In-App Purchase, Paddle, *available at* https://www.paddle.com/platform/in-app-purchase.

Aftermarket remaining with Google. Those that remain with Google would still benefit from lower take rates, as Google would be forced to lower its take rate to remain competitive according to standard economic principles.[43]

B. All or Almost All Class Members Would Have Paid Lower Prices in a More Competitive But-For World

20. This section responds to Part VI.B of the Burtis Report, in which Dr. Burtis claims that "Differences in cost conditions for different apps, differences in the demand elasticities for different apps, and differences in app developers' pricing strategies indicate that many developers would not charge lower retail prices for apps, subscriptions, and IAPs in a but-for world with uniformly lower service fees."[44]

1. Individualized Analysis of Developer Marginal Costs Is Not Necessary To Demonstrate Classwide Impact

21. In Part VI.B.1 of the Burtis Report, Dr. Burtis claims that some Apps have zero marginal costs, while others have positive and substantial marginal costs, and suggests that Apps with zero marginal costs are "less likely" to charge lower prices to consumers when their take rates are lower.[45] Dr. Burtis provides *no evidence* that any App actually has zero marginal cost. She would be hard pressed to come up with a relevant example, given that developers incur variable payment processing costs whenever they transact with their customers. Dr. Burtis also ignores that the take rate itself represents a marginal cost that applies to the initial App purchase and any purchase of In-App Content.[46]

22. Dr. Burtis herself identifies various additional marginal costs incurred by Apps, including customer support, processing of customer information, and other costs that naturally increase with the number of users.[47] The economic literature recognizes that "ongoing marginal costs for app developers arise from various maintenance tasks after app development."[48] Per Ghosh and Han (2014), sources of ongoing marginal costs for developers include (but are not limited to): "1)

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43. Singer Report ¶¶213-220.
44. Burtis Report ¶139.
45. *Id.* ¶142.
46. The take rate is analogous to the royalty stack that exists in the mobile phone market; this is the aggregation of individual patent royalties paid to individual standard essential patent holders, whose intellectual property the end product (the mobile phone) includes. "Running royalties," which are royalties that increase with the number of units sold, as do developer payments to Google, are considered a marginal cost. *See, e.g.,* Alexander Galetovic, Stephen Haber, Lew Zaretzki, *An estimate of the average cumulative royalty yield in the world mobile phone industry: Theory, measurement and results*, 42(3) TELECOMMUNICATIONS POLICY 263, 264 (2018) ("A standard-compliant phone uses hundreds, if not thousands of standard essential patents (SEPs) owned by a large number of SEP holders. Each SEP holder sets her running royalty rate independently, and the result is that excessive running royalties are piled on top of excessive running royalties—a theoretical construct that is called 'royalty stacking.' This royalty stack drives up the marginal cost of manufacturing phones, thereby increasing prices to consumers, and discouraging innovation by manufacturers."). *Id.* at 266 ("As the well-known theory of vertical control shows, running royalties will ultimately show up in the marginal cost of manufacturing a phone no matter where they are charged in the value chain.").
47. Burtis Report ¶¶144-146.
48. Anindya Ghose & Sang Pil Han, *Estimating Demand for Mobile Applications in the New Economy*, 60(6) MANAGEMENT SCIENCE 1470, 1474 (2014).

fixing crashes or errors reported by users of the app, 2) adding features requested by users after release, 3) user support … and 4) scaling costs."[49]

23. Dr. Burtis claims that "if an app has zero (or close to zero) marginal cost, a reduction in the service fee rate will be less likely to lead to a change in the retail price of the app."[50] Ignoring the evidence of positive marginal costs above, if what Dr. Burtis was proposing were true, then imposing a percentage sales tax on an App should have little or no effect on its pricing. But, as explained in the Singer Report, when a digital product is subject to a sales tax, this burden is typically passed through in full to the customer.[51] [redacted][52] In addition, according to Dr. Burtis's logic, developers would not charge a higher price in the Play Store than on their websites. That some do, as shown in Table 9 of the Singer Report, implies that (despite the Challenged Conduct), lower take rates have led to lower prices for these developers.

24. More fundamentally, Dr. Burtis ignores that the competitive but-for world is a long-run equilibrium, in which Google's take rate is substantially and permanently lower for all or almost all developers. Standard economics shows that a developer's decision to enter and remain in the market depends on its ability both to cover its explicit costs and to earn a competitive rate of return. A developer obligated to pay 30 percent of its revenue to Google in perpetuity needs to charge a higher price to consumers than a developer facing a substantially and permanently lower take rate; the greater the take rate, the higher the developer's price will need to be for the developer to earn a competitive rate of return.[53]

25. In summary, demonstrating classwide impact does not require individualized analysis of developer costs; what matters is that developers with substantially and permanently lower costs in the but-for world would charge lower prices to all or almost all Class members.[54] As explained in Part II.A.1 below, I have employed standard economic models that fit the data and facts of this case to quantify this pass-through.

2. Individualized Analysis of Developer Pricing Strategies Is Not Necessary to Demonstrate Classwide Impact

26. In Part VI.B.2 of the Burtis Report, Dr. Burtis claims that individualized inquiry would be necessary because many developers use a "strategy of setting retail prices that end in '99.'"[55] According to Dr. Burtis, developers would be reluctant to reduce prices to a number not

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49. *Id.* at 1477.
50. Burtis Report ¶142.
51. Singer Report ¶244.
52. In the Singer Report, I performed instrumental variable ("IV") regressions using Google's app revenue metrics data. Singer Report ¶¶237-238. In the first stage of the IV regressions, taxes are used as an exogenous instrument that shifts price independently of other demand drivers. According to those first-stage regressions, there is a positive and highly statistically significant relationship between taxes and App prices, even after controlling for more than 200,000 App-level fixed effects.
53. Singer Report ¶227.
54. *Id.* Part V.D.
55. Burtis Report ¶148.

ending in $0.99. [redacted] This is inconsistent with Dr. Burtis's claim that developers would somehow feel compelled to charge prices ending only in "99" in the but-for world.

27. According to Dr. Burtis's logic, developers would not charge a price ending with any digits other than 99 for downloading an App on their websites. [redacted]

28. To illustrate, suppose that a developer has consistently charged $1.99 for In-App Content in the actual world due, in part, to focal-point pricing. Google would have kept $0.597 per transaction (equal to 30 percent of $1.99), remitting the remainder to the developer. Steering is prohibited for this developer in the actual world. The gross margin on each in-app transaction (before considering other marginal costs) is $1.39 (equal to $1.99 less $0.597). In a but-for world, a new payment processor (such as Paddle) emerges due to the elimination of the Aftermarket Restrictions and charges a ten percent take rate, which for this developer, would be $0.199 at the original price of $1.99. With steering permitted, the developer can realize cost savings of $0.398 per transaction (equal to approximately $0.597 less $0.199), but only if the developer can induce its customers to use the new payment processor rather than Google Play Billing. At this point, it is now profit-maximizing for the developer to deviate from focal-point pricing and share a portion of the savings with its customer via a lower price for in-app purchases. For example, the developer could drop its price for In-App Content made via the new processor to (say) $1.79, effectively splitting the savings with the customer for making the right choice. The developer's fee to the third-party payment processor falls to $0.179 per transaction (equal to 10 percent of $1.79). The developer's new gross margin (before considering other marginal costs) on transactions processed via the third-party processor is $1.61 (equal to $1.79 less $0.179), which exceeds the prior gross margin of $1.39. It no longer pays to abide by focal-point pricing. A key reason we do not see such deviations from focal-point pricing in the actual world is that developers are not afforded the opportunity to steer due to the Aftermarket Restrictions. Moreover, in the few episodes where we do observe steering in the actual world, developers have been observed to deviate from 99-cent pricing increments, as shown in Table 9 of the Singer Report.

29. Dr. Burtis also ignores that Google *required* developers, until very recently, to charge at least 99 cents. Thus, for a large number of developers, the observed prices in the actual world could be the result of a restraint that Google imposed on their pricing. Record evidence indicates

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56. *Id*. Figure 7.

57. Of the 200 "Top paid apps" in the Play Store, 43 of them (or 21.5 percent) have initial download prices that do not end in "99." *See* backup materials to this report. *See also* Top Paid Apps, Google Play, *available at* https://play.google.com/store/apps/collection/cluster?clp=0g4jCiEKG3RvcHNlbGxpbmdfcGFpZF9BUFBMSUNBVElPThAHGAM%3D:S:ANO1ljLdnoU&gsr=CibSDiMKIQobdG9wc2VsbGluZ19wYWlkX0FQUExJQ0FUSU9OEAcYAw%3D%3D:S:ANO1ljIKVpg.

that [redacted].[58] That Google imposed a 99-cent restriction on developers implies that Google believed developers would deviate from such pricing; if focal-point pricing was as powerful as Dr. Burtis claims, Google's restraint would have been unnecessary. I understand that Plaintiffs challenged Google's 99-cent restriction in the Complaint,[59] as undermining price competition among developers, which implies that such a restriction would be absent in the but-for world.

30. To the extent developers would prefer to maintain "supermarket-style" pricing in the but-for world, they could do so simply by ending their prices in "9," instead of "99" (e.g., $2.49), or in or in "5" (e.g. $4.95) as many do today.[60] (Thus, the solution above to my hypothetical example of steering was $1.79, twenty cents below $1.99, but still ending in a nine.) Sellers' strategy of ending prices in "9" or "5", such as $2.99 or $2.95" is commonly known as "odd pricing," "psychological pricing," or "charm pricing." The strategic reasoning that underlies this practice rests on the belief that consumers will focus on the numbers to the left of the decimal, thus demonstrating higher demand for a good priced at $2.99 than $3.00, despite the negligible price difference of one cent. The economic literature has classified odd prices to include those within 5 cents of the nearest highest dollar (.95 to .99) or one cent below the next highest ten cents (.19, .29, etc.).[61] Market practitioners sometimes apply the same heuristic, underscoring the fact that odd pricing does not limit itself only to prices ending in "99."[62] Thus, Dr. Burtis errs in her attempt to cabin this strategy to such prices. Nothing would prevent developers from setting prices at $1.79 versus $1.99, for

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58. *See* GOOG-PLAY-000355570.R at GOOG-PLAY-000355597.R ([redacted]). The Play Store ultimately removed its $0.99 minimum pricing rule in our around early 2022. Archived web pages show that the Play Store had a U.S. minimum price of $0.99 as of late 2021. Play Console Help, Supported Locations for Distribution to Google Play Users, accessed Dec. 27, 2021, *available at* https://web.archive.org/web/20211227224037/https:/support.google.com/googleplay/android-developer/answer/10532353?visit_id=637762416354084080-1400722469&rd=1. As of mid-February 2022, the minimum price is listed at $0.05. Play Console Help, Supported Locations for Distribution to Google Play Users, accessed Feb. 18, 2022, *available at* https://web.archive.org/web/20220218131358/https:/support.google.com/googleplay/android-developer/answer/10532353?visit_id=637807868385671271-2942202130&rd=1.

59. Complaint at ¶¶18, 173, *In re Google Play Consumer Antitrust Litigation*, No. 3:20-CV-05761-JD (Dec. 20, 2021).

60. *See, e.g.*, Top Paid Apps, Google Play , *available at* https://play.google.com/store/apps/collection/cluster?clp=0g4jCiEKG3RvcHNlbGxpbmdfcGFpZF9BUFBMSUNBVElPThAHGAM%3D:S:ANO1ljLdnoU&gsr=CibSDiMKIQobdG9wc2VsbGluZ19wYWlkX0FQUExJQ0FUSU9OEAcYAw%3D%3D:S:ANO1ljIKVpg. (showing various "Top paid apps" with prices that do not end in "99." For example, as of April 21, 2022, the third most-popular paid App was "Torque Pro (OBD 2 & Car)," priced at $4.95 per download on the Play Store. Another paid App in the Top 20 was "Tasker," priced at $3.49 per download on the Play Store).

61. Judith Holdershaw, Philip Gendall and Ron Garland, *The Widespread Use of Odd Pricing in the Retail Sector*, MARKETING BULLETIN, 8, 1997, 53-58, Research Note 1, *available at* http://marketing-bulletin massey.ac nz/V8/MB_V8_N1_Holdershaw.pdf.

62. *See* PriceIntelligently, Odd-Even Pricing, *available at* https://www.priceintelligently.com/odd-even-pricing# ("Odd pricing refers to a price ending in 1,3,5,7,9 just under a round number, such as $0.19, $2.47, or $64.93"). *See also*, Shopify, Odd-Even Pricing, *available at* https://www.shopify.com/encyclopedia/odd-even-pricing ("Odd-even pricing is a pricing strategy involving the last digit of a product or service price. Prices ending in an odd number, such as $1.99 or $78.25, use an odd pricing strategy, whereas prices ending in an even number, such as $200.00 or 18.50, use an even strategy").

example, as a result of a decrease in the take rate. As illustrated in Figure 3 below, "supermarket pricing" is already observed in the Play Store, with prices at regular, ten-cent intervals.

This pattern of ten-cent (or smaller) pricing increments remains consistent until price points above $100 are reached.[63]

31. In Part VI.B.2 of the Burtis Report, Dr. Burtis also claims that individualized inquiry would be necessary because "[d]evelopers use other price-setting strategies, besides short-term profit maximization."[64] Dr. Burtis ignores that the basic economic logic of pass-through applies both to short-run and long-run profit maximization. In the short run, positive marginal costs are sufficient to generate pass-through given a change in the take rate (and Dr. Burtis has not shown that any developer faces zero marginal costs). Moreover, to remain in business over the long run, a firm must recover not just its marginal costs, but its recurring fixed costs, in addition to covering its cost of capital.[65] All else equal, developers facing higher take rates must charge higher prices to remain in business. Consumers will therefore pay lower prices in a more competitive but-for world, regardless of whether one assumes that developers are maximizing profit over the short run or the long run.

63. Google Transaction Data (GOOG-PLAY-007203251).
64. Burtis Report ¶¶153-154.
65. Singer Report ¶¶223-226; *see also* Part I.B.1 above.

3. Individualized Analysis of Competitive Conditions Is Not Necessary to Demonstrate Classwide Impact

32. In Part VI.B.3 of the Burtis Report, Dr. Burtis claims that individualized analysis is necessary because developers facing different demand elasticities (that is, different competitive conditions) might not cut their prices by the same amount in the but-for world.[66] Dr. Burtis ignores that, although the extent of pass-through to consumers of a reduction in a developer's costs may vary with competitive conditions, the fact of pass-through does not. For example, as explained in the Singer Report, even a profit-maximizing monopolist will pass on a portion of cost savings to consumers.[67] Moreover, as explained in the Singer Report and in Part II.A.1 below, my pass-through analysis allows me to quantify the extent of pass-through using standard economic methods that account for differences in the competitive conditions facing different developers: I use a standard logit demand systems frequently employed by economists seeking to model pricing decisions among differentiated firms.[68] This provides a standard, tractable economic framework to estimate equilibrium pass-through rates for thousands of developers making thousands of interdependent pricing decisions for each of their Apps and In-App Content.

C. Dr. Burtis Fails to Identify Additional Economic Reasons Class Members Were Uninjured

33. In Part VI.C of the Burtis Report, Dr. Burtis claims to offer additional "economic reasons some members of the putative consumer Class would not be better off in the but-for world."[69]

1. Dr. Burtis Fails to Identify Customers Who Would Not Have Paid Lower Retail Prices in the But-For World

34. In Part VI.C.1 of the Burtis Report, Dr. Burtis claims that some consumers were not impacted because "[c]ertain retail prices are the same in Google Play as prices on the relevant developer's website."[70] This ignores that the Challenged Conduct removes the full incentives that would be present for developers to steer to their website for both App downloads and In-App Content. With respect to the In-App Aftermarket, Google's anti-steering restrictions explicitly prevent developers from directing customers *inside* an App downloaded from the Play Store to lower-cost options outside of the Play Store. Because they cannot steer customers from within the Play Store, developers are deprived of what is likely the most efficient channel for steering and have

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66. Burtis Report ¶¶155-160.

67. Singer Report ¶223. The Singer Report also demonstrates that pass-through can be calculated for individual App categories using data and methods common to the Class. *Id.* Table 8.

68. *See* Part II.A.1 below; *see also* Gregory Werden & Luke Froeb, *The Antitrust Logit Model For Predicting Unilateral Competitive Effects,* 70 ANTITRUST LAW JOURNAL 257 (2002); Nathan Miller, Conor Ryan, Marc Remer, & Gloria Sheu*, Approximating the Price Effects of Mergers: Numerical Evidence and an Empirical Application* DOJ Economic Analysis Group Discussion Paper 12-8 (2012), at 2 (explaining logit is one of the demand systems "that commonly are employed in antitrust analysis."). Dr. Burtis concedes that logit demand is "frequently used in economics[.]" Burtis Report ¶306.

69. Burtis Report ¶¶161-167.

70. *Id.* ¶169.

less of an incentive to attempt to drive traffic to their websites.[71] Moreover, for initial App downloads in the Android App Distribution Market, Google has placed significant restrictions on users attempting to download competing Apps, including non-Google app stores.[72] These restrictions decrease the likelihood that steering would be successful in the Android App Distribution Market.[73] In light of these impediments, that some developers have not engaged in steering in the actual world does not imply that they would not do so in a more competitive but-for world.

2. Dr. Burtis Fails to Show That Consumers Transacting at "Lower Price Points" Were Not Impacted

35. In Part VI.C.2 of the Burtis Report, Dr. Burtis claims that some Class members were not impacted due to developers' tendency to select prices ending in "99."[74] I have already responded to this claim in Part I.A.2 above.

3. Dr. Burtis Fails to Show That Consumers Using Higher-Cost Payment Methods such as Direct Carrier Billing Were Not Impacted

36. Dr. Burtis claims that consumers who rely on "relatively expensive forms of payment to transact in Google Pay, such as direct carrier billing ('DCB') and gift cards" would not have been better off in a more competitive but-for world because "[redacted]"[75]

37. Dr. Burtis ignores that the same competitive forces that would lower prices for *lower*-cost forms of payment in the but-for world would also apply to *higher*-cost forms of payment. Dr. Burtis's logic presumes that consumers would not switch to a different payment form if they could take advantage of the lower prices that would prevail under the competitive counterfactual. Consumers who use DCB currently pay the same App price as those who do not. But in the "but-for" world, those who use other forms of payment would pay less, as developers pass through the cost savings from the reduced take rate. Payment processing via DCB would either have to fall to

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71. Singer Report ¶¶25-26. In the actual world, some developers have attempted to engage in limited steering by setting a lower price on their websites, but this strategy depends on making consumers aware of the pricing differential outside of the Play Store. *Id*. ¶¶242-244; Table 9.

72. *Id*.¶¶129-130. For example, to download the Amazon app store in 2016, a user had to complete a series of 19 steps, including selecting "Unknown Sources" within the user's security settings, and navigating three separate security warnings. A Google presentation recognized the significance of this sideloading deterrent by documenting the 19 steps required to successfully install Amazon Underground. *See* GOOG-PLAY-000297309.R at GOOG-PLAY-00297311.R-00297314.R. *See also* Expert Report Of Douglas Craig Schmidt, PhD (February 28, 2022), Part IV.A (Google Android Forces Users To Go Through the Unknown Sources Flow To Install Apps, Including Non-Google App Stores, Outside Of The Google Play Store).

73. *See* AMZ-GP_00003257 at -3258 ([redacted]). *See also* GOOG-PLAY-002414772 ([redacted]).

74. Burtis Report ¶¶148-152.

75. *Id*. ¶164; ¶¶183-185. [redacted] (GOOG-PLAY-007203251).

meet the new competitive benchmark or risk customers abandoning DCB in favor of lower prices elsewhere.

38. Dr. Burtis also ignores that [redacted][76] This real-world evidence contradicts Dr. Burtis's speculation regarding a more competitive but-for world.

4. Dr. Burtis's Claim [redacted] in the But-For World Is Without Merit

39. In Part VI.C.4 of the Burtis Report, Dr. Burtis claims that Google would [redacted].[77] The claim that Google would be willing [redacted] is without merit. As an initial matter, Dr. Burtis ignores that Google would continue to be compensated for any In-App Aftermarket services that it provides in a more competitive but-for world—the difference being that Google would have to compete on the merits to win the business of those developers by offering a more competitive take rate.

40. In addition, as the distributor of the initial application and the owner of the Android operating system, Google would have an incumbency advantage, providing it with a continued economic incentive to distribute as many applications as possible.[78]

41. The economics of two-sided platforms also makes it unlikely that Google would [redacted] As explained in the Singer Report, because a large user base is critical to unlocking indirect network effects, two-sided platforms such as the Play Store are incentivized to provide free access to users (or even to subsidize access to users) to maximize participation by both users and developers.[79] This allows two-sided digital platforms to get "both sides on board."[80] Encouraging use of the platform by one group serves to attract the group on the opposite side of the platform.[81] In the instant case, allowing consumers to browse the Play Store for free and download free Apps creates a benefit for Google due to the indirect network effects

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76. [redacted] See GOOG-PLAY-003605103 at Ex. 10 ([redacted]); GOOG-PLAY-001507837 at Ex. B [redacted].

77. Burtis Report ¶¶186-189.

78. Even in the presence of substantial competition, I assume conservatively that Google's incumbency advantage would have allowed it to retain a substantial market share of 60 percent. Singer Report ¶192; ¶219.

79. Singer Report ¶¶270-271.

80. *Id.* ¶¶270-271.

81. Jean-Charles Rochet & Jean Tirole, *Platform Competition in Two-Sided Markets,* 1(4) JOURNAL OF THE EUROPEAN ECONOMIC ASSOCIATION 990, 991 (2003).

in attracting more developers and additional money Google can make by attracting advertisers.[82] As a consequence, the Play Store earns billions of dollars annually on ads that appear in the Play Store, with almost all of those revenues falling to the bottom line.[83] Free Apps in the Play Store are economically analogous to consumer inducements on a range of other two-sided platforms, such as credit cards (which often subsidize customers through loyalty programs), broadcast radio and television, (which offer free content to viewers or listeners), restaurant reservation software such as OpenTable (free to diners), and so on.[84]

42. According to a 2020 Google analysis, [redacted]

43. Deposition testimony of Jamie Rosenberg, Vice President of Strategy and Operations for Google's Platforms and Ecosystems Division, [redacted]

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82. [redacted]

83. Singer Report ¶69.

84. *See, e.g.,* David Evans, *Two-Sided Market Definition* in MARKET DEFINITION IN ANTITRUST: THEORY AND CASE STUDIES (ABA Section of Antitrust Law) 1-35, 5 (2009), *available at* papers.ssrn.com/sol3/papers.cfm?abstract_id=1396751

85. GOOG-PLAY-006990552 at GOOG-PLAY-006990554.

86. GOOG-PLAY-006990552.

87. Singer Report ¶69.

88. Deposition of Jamie Rosenberg (Feb. 10, 2022) at 412:5-413:14 ([redacted]

[redacted][89]

44. Thus, Google's network-driven incentive to draw as many users as possible into the Google ecosystem (including the GMS suite) would remain in a more competitive but-for world with substantially lower take rates. Google would continue to benefit from indirect network effects even under competition—the more consumers it retains (by eschewing an upfront user fee), the more Apps it can attract, and the more advertisers will come to its platform. Setting aside that Google would continue earning revenues from a more competitive take rate—and one several percentage points above the competitive rate[90]—any reduction in revenue from a lower take rate would be mitigated, at least in part if not wholly, by the continued advertising revenue generated from maintaining its user base. Google also would continue to bring users to its products, just as it does for Apps in the GMS suite that are free to consumers. Accordingly, Google likely would [redacted]

45. Dr. Burtis ignores that when the Play Store cut its take rate from 30 percent to 15 percent for subscriptions longer than a year, it did not seek to offset the lost take-rate revenue by [redacted] Similarly, Google did [redacted] when it cut the take rate from 30 percent to 15 percent for the first $1 million in developer revenue. This suggests that, in a competitive but-for world in which Google would have to lower its take rate due to competition, it would still not [redacted]

5. Dr. Burtis's Claim That Some Consumers Would Incur Higher Security Costs in the But-For World Is Without Merit

46. In Part VI.C.5, Dr. Burtis claims that some consumers would have incurred higher security costs in the but-for world. This claim is without merit. Dr. Burtis has provided no evidence or analysis to suggest that Google would stop investing in security in a competitive but-for world. Indeed, Google asserts that providing strong security is essential to integrity of Android and the Play

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[redacted]).

89. GOOG-PLAY-001501104 at GOOG-PLAY-001501105 ([redacted] *See* GOOG-PLAY-000416245.

90. My economic model allows for Google to charge a markup over the competitive rate, even in the competitive but-for world, due to its incumbency advantage. Singer Report ¶220.

Store;[91] taking that statement at face value, there is no reason to suspect that Google would abandon its efforts to provide security in a competitive world.

47. Dr. Burtis also fails to recognize that monetization from the Play Store—and thus compensation for these basic features—does not end with the lifting of the Aftermarket Restrictions. Google would continue to capture commission-based revenue from the Play Store and from In-App Content sold through Google Play Billing in the competitive but-for world (again, at a premium above the competitive payment processing rate given its incumbency advantage). Although Google's take rate and market share in the but-for world would be lower than in the actual world, the size of the market would be substantially larger, given the substantial reduction in prices.[92] And Google would also continue to capture high-margin advertising revenue from the Play Store. These revenue streams would more than cover the cost of providing security, privacy, convenience, developer tools, and payment processing, while still allowing Google to earn a profit.[93]

48. Moreover, if the Aftermarket Restrictions were really necessary for delivering security, then one would expect Google to impose the Aftermarket Restrictions on all transactions. It does not; in fact, Google allows Apps to choose a third-party payment processor for certain types of purchases. Although Google requires the use of Google Play Billing for purchases of digital items, it *prohibits* the use of Google Play Billing for "purchases or rentals of physical goods," "purchases of physical services," and the "payment of a credit card or utility bill."[94] In addition, if the Aftermarket Restrictions were really necessary for delivering security, one would also expect to see similar restrictions employed by other app stores. As noted by Jared Sine, Chief Legal Officer of Match Group, in his April 2021 Congressional testimony: "If mandatory in-app payment was truly about security, it would stand to reason that every business would need to use it."[95] That competitive app store providers such as ONE Store and Aptoide do not impose aftermarket restrictions in their own stores, and that Google does not impose them on all types of purchases, implies that the Aftermarket Restrictions are not essential to preserving security in Android App Distribution Market.

49. In fact, the elimination of the Challenged Conduct in the Android App Distribution Market would invite more app store entry, and thus more competition on both price and non-price

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91. *See, e.g., Secure an Android Device*, *available at* https://source.android.com/security/overview ("Android incorporates industry-leading security features and works with developers and device implementers to keep the Android platform and ecosystem safe. A robust security model is essential to enable a vigorous ecosystem of apps and devices built on and around the Android platform and supported by cloud services.").

92. *See, e.g.,* N. GREGORY MANKIW, PRINCIPLES OF MICROECONOMICS 67 (Cengage Learning 8th ed. 2018) [hereafter MANKIW]. ("This relationship between price and quantity demanded is true for most goods in the economy and, in fact, is so pervasive that economists call it the **law of demand**: Other things being equal, when the price of a good rises, the quantity demanded of the good falls, and when the price falls, the quantity demanded rises.") (emphasis in original).

93. In a more competitive but-for world, I estimate that the Play Store's but-for operating profit over the period 2015 – 2021 would come to $24.1 billion, compared with $41.5 billion in the actual world. *See* backup materials for this report.

94. *See Understanding Google Play's Payments Policy, available at:* https://support.google.com/googleplay/android-developer/answer/10281818.

95. Testimony for the U.S. Senate Judiciary Committee, Subcommittee on Competition Policy, Antitrust, and Consumer Rights, Jared Sine, Chief Legal Officer, Match Group, April 21, 2021 at 3.

dimensions such as security. Dr. Burtis's security claim is akin to claiming that Google would slow downloads in a competitive environment; if it tried, customer defection would be even greater. Consumers would benefit significantly from this added platform competition via multi-homing and steering, and Google would be punished if it were to unilaterally degrade the quality of its app store by paring back any of these features. If users value security as much as Google claims, then Google would retain strong economic incentives in a more competitive but-for world to invest in security to attract users.

D. Dr. Burtis's Speculation About Google's But For "Monetization Strategy" Fails to Demonstrate That Some Developers Would Have Been Worse Off in a More Competitive But-For World

50. In Part VI.D of the Burtis Report, Dr. Burtis discusses various purported "monetization strategies" that she claims Google would adopt in the but-for world. I note that many of Dr. Burtis's claims in Part VI.D of her report have already been addressed in Part I.C.4 above. In what follows, I focus on new claims. Importantly, none of Dr. Burtis's purported alternative monetization strategies has actually been adopted by Google. In addition, Google would have remained profitable in the but-for world even in the absence of alternative monetization strategies.[96]

51. Dr. Burtis also ignores that the Challenged Conduct confers substantially more market power on the Play Store than it would have enjoyed in a more competitive but-for world. The robust competition that the Play Store would face in the but-for world makes it even *less* likely that Google would have the incentive and the ability to implement the alternative monetization strategies set forth by Dr. Burtis, all of which would render the Play Store less attractive to consumers and developers.

1. Dr. Burtis's Claims Regarding a "[redacted]" Do Not Refute Classwide Impact

52. In Part VI.D.1 of the Burtis Report, Dr. Burtis cites to documents indicating that [redacted] As explained in Part I.C.4 above, [redacted][97]

53. Dr. Burtis offers the example of [redacted].[98] As Dr. Burtis notes, [redacted]

96. *See* n. 93, *supra*.
97. GOOG-PLAY-007346993 at -034. [redacted].
98. Burtis Report ¶199.

[redacted]

In summary, this example merely illustrates why a "[redacted]" is unlikely to be in Google's economic interest.

2. Dr. Burtis's Claims Regarding [redacted] Do Not Refute Classwide Impact

54. In Part VI.D.2 of the Burtis Report, Dr. Burtis suggests that in a more competitive world, Google might attempt to [redacted] and that this would effectively increase the take rate above 30 percent for the majority of developers.[100] Again, this alternative pricing strategy is purely speculative. Google currently charges a *one-time* fee of a modest $25 to open a developer account, presumably because that strategy is profit-maximizing; if a [redacted] were profitable, Google would have imposed such a fee already. By Dr. Burtis's own calculations, moving to [redacted] would impose higher costs on two-thirds of developers.[101] To the extent that these increased costs are economically significant, they could induce some developers to leave the platform entirely, or to purchase less advertising, or to scale back their offerings—all of which would undermine the virtuous indirect network effects that benefit the Play Store. To the extent that the increased costs from a [redacted] are not economically significant (they would not be for larger developers), then Dr. Burtis's speculation is irrelevant. Moreover, Dr. Burtis implausibly posits that Google would charge a *higher* effective take rate—in excess of 30 percent—to the majority of developers in a *more* competitive but-for world.[102] Dr. Burtis ignores the elementary economic principle that increased competition would lower prices, not increase them.

3. Dr. Burtis's Claims Regarding [redacted] Do Not Refute Classwide Impact

55. In Part VI.D.3 of the Burtis Report, Dr. Burtis speculates that some developers would not have been impacted [redacted][103] Dr. Burtis relies on evidence [redacted][104] In Dr. Burtis's view, developers with Apps [redacted]

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99. *Id.* As Dr. Burtis observes, even [redacted] Burtis Report ¶199, n. 225; *see also* GOOG-PLAY-000336574 at GOOG-PLAY-000336588; GOOG-PLAY-006990552 at GOOG-PLAY-006990554, GOOG-PLAY-006990565.
100. Burtis Report ¶¶201-202
101. According to Dr. Burtis: "If, in the but-for world, [redacted]).
102. *Id.* ¶202.
103. *Id.* ¶203.
104. *Id.* ¶204.

[redacted][106]

56. Dr. Burtis is wrong. As before, Dr. Burtis's speculative alternative monetization strategy ignores [redacted] in which the Play Store enjoys substantial market power owing to the Challenged Conduct. [redacted] would allow Google to extend its power into the In-App Aftermarket, presumably via the assistance of the Aftermarket Restrictions (or something similar), in violation of the counterfactual assumption an economist makes when modeling the but-for world. Put differently, Dr. Burtis's speculative [redacted] incorrectly presupposes that, in the but-for world, Google could tie Google Play Billing with App distribution. Moreover, because Google would face increased competition in the but-for world, Dr. Burtis has no basis to assume that [redacted] Dr. Burtis ignores that competition would impair Google's ability to implement a fee structure that would force developers to pay supracompetitive prices; if Google implemented a supracompetitive fee structure, developers and their customers would gravitate to a lower-cost platform.

4. Dr. Burtis's Claims Regarding Increases in the Play Store "[redacted]" Do Not Refute Classwide Impact

57. In Part VI.D.4 of the Burtis Report, Dr. Burtis cites evidence that Google considered [redacted][107] In other words, [redacted][108] Dr. Burtis argues that, although this would have benefitted "developers that value and are willing to pay for user acquisition and re-engagement,"[109] it could have [redacted][111]

58. Dr. Burtis provides no specific examples of developers (let alone consumers) that would have been harmed by this alternative monetization strategy. Such proof would require demonstrating that, in a more competitive but-for world, the benefits to developers of a substantially and permanently lower take rate would have been more than eliminated by increased costs of

105. *Id.* ¶205.
106. *Id.*; Table 7.
107. *Id.* ¶207.
108. *Id.*
109. *Id.* ¶208.
110. *Id.* ¶209.
111. For example, if [redacted]

[redacted]. In a more competitive but-for world, Google likely would have lacked the ability and incentive to force such an offer on developers.

59. Dr. Burtis also speculates that [redacted][112] But this does not imply that these developers (let alone their customers) would be harmed under this hypothetical monetization strategy; according to the record evidence she cites, these [redacted][113] would, by definition, achieve newfound economic gains.

60. As before, Dr. Burtis assumes nonsensically that, in a more competitive but-for world, Google would have had the incentive and the ability to implement alternative monetization strategies that Google declined to implement in the actual world.

E. Dr. Burtis's Additional Reasons That Developers Would Have Been Worse Off in a More Competitive But-For World Do Not Refute Classwide Impact

61. In Part VI.E of the Burtis Report, Dr. Burtis again offers a parade of horribles that would ensue in a more competitive but-for world. Dr. Burtis's claims contradict standard economics, which shows that competition benefits consumers. I address each claim below.

1. Dr. Burtis's Claim That Some Developers Would Have Incurred Higher App Distribution Costs Does Not Refute Classwide Impact

62. In Part VI.E.1 of the Burtis Report, Dr. Burtis claims that, in the competitive but-for world, developers would have had to offer Apps on more stores, thus incurring extra costs, and that these extra costs would have cancelled out the procompetitive benefits of substantially and permanently lower take rates. As an initial matter, a developer would not have to offer Apps on multiple stores in order to benefit from the results of competition in the but-for world. The mere threat of developers defecting to a competing platform, combined with actual defection (and steering) by other developers, would spur Google to decrease its take rate, in order to keep as many developers as possible on its platform.

63. Dr. Burtis's argument implies that higher output would represent an antitrust *harm*, a position inconsistent with standard economics, which posits the exact opposite—greater output benefits consumers.[114] To the extent developers would choose to offer their Apps on multiple platforms, they would attract more customers. Consumers who multi-home would be attracted by an App's availability on multiple platforms, thus potentially increasing the App's brand recognition and its reach. Dr. Burtis's claim implies nonsensically that developers would choose to offer multi-platform availability when the cost of doing so exceeds the benefits. Dr. Burtis provides no evidence that the incremental benefits of substantially and permanently lower take rates would be eliminated

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112. Burtis Report ¶211.
113. *Id.*, n. 240, citing GOOG-PLAY-006990552 at -554 ([redacted]).
114. MANKIW, *supra*, at 301-302.

by the (presumably modest) incremental costs associated with operating on multiple app stores (all of which would be Android-compatible). Indeed, she relies on evidence indicating that [redacted][116] In a more competitive but-for world, competing app stores would have expanded opportunities to attract a larger user base.

2. Dr. Burtis's Claim That Some Developers Likely Would Have Obtained Fewer App Distribution Services Does Not Refute Classwide Impact

64. In Part VI.E.2 of the Burtis Report, Dr. Burtis speculates that Google may have chosen to make fewer services available to some developers in a more competitive but-for world. This claim ignores that Google would likely have faced *greater* competitive pressure to expand its service offerings (or at least keep them the same) in order to compete with its rivals. Economic principles prescribe that as competition increases, firms compete more vigorously for customers on all dimensions, including services.[117] If Google attempted to degrade its service offerings in the but-for world, developers could switch to a competitive rival with similar offerings.

65. Dr. Burtis also speculates that developers that earn revenue from In-App Content could be worse off than developers that earn revenue from advertising, because Google "would have had economic incentives to invest more in tools for ads than in tools for IAPs."[118] As before, such speculation ignores the principle that competition likely would have compelled Google to *expand* its service offerings in the competitive but-for world. Google's internal documents suggest that [redacted][120]

66. Additionally, Dr. Burtis repeats her claim that "[d]evelopers that rely more on direct carrier billing [DCB] would have been worse off than developers not reliant on that payment form."[121] I have already responded to this claim in Section I.C.3 above.

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115. Burtis Report ¶217, n. 243 (citing GOOG-PLAY-000560564 at 575 ([redacted])

116. *Id.*

117. Department of Justice & Federal Trade Commission, *Horizontal Merger Guidelines* (08/19/2010) §1 ("For simplicity of exposition, these Guidelines generally discuss the analysis in terms of such price effects. Enhanced market power can also be manifested in non-price terms and conditions that adversely affect customers, including reduced product quality, reduced product variety, reduced service, or diminished innovation.")

118. Burtis Report ¶226.

119. GOOG-PLAY-007745829 at -829.

120. *Id.* at -831.

121. Burtis Report ¶227.

II. DR. BURTIS'S REBUTTALS TO MY ECONOMIC ANALYSIS OF PASS-THROUGH AND BUT-FOR TAKE RATES ARE WITHOUT MERIT

67. In this Section, I respond to Part VIII of the Burtis Report.

A. Dr. Burtis's Rebuttals to My Economic Analysis of Pass-Through Are Without Merit

68. In Part VIII.D of the Burtis Report,[122] Dr. Burtis argues incorrectly that my pass-through analysis "depends on unsupported assumptions, and includes no analysis of any service fee rate change or any cost change at all."[123] As detailed below, this is false: My pass-through analysis relies on standard economic methods showing how developers selling differentiated Apps would optimally adjust prices downward, according to the degree of concentration in their App category, in response to a decrease in marginal costs due to substantially and permanently lower take rates in the competitive but-for world. Dr. Burtis does not dispute that my pass-through calculations are based on standard economic models, nor does she dispute that I used standard econometric techniques to establish their applicability to the transactional data produced by Google. Instead, Dr. Burtis misleadingly criticizes the standard pass-through formulae derived from these standard economic models for their (relative) simplicity, ignoring all the calculations that work in the background to produce a deceptively straightforward result.

69. Dr. Burtis also claims incorrectly that my pass-through analysis "produces false results" based on pass-through analyses she performs purporting to demonstrate that various Apps' prices were unchanged after the developers experienced a decrease in the take rate.[124] As detailed in Part IV below, Dr. Burtis's pass-through analysis is fatally flawed. None of Dr. Burtis's pass-through analysis is capable of reliably measuring the effects of the substantially and permanently lower take rates for all or almost all developers that would have prevailed in a more competitive but-for world where Google's anticompetitive restraints were absent.

1. My Pass-Through Methodology Relies on Standard Economic Models That Fit the Data and Facts of This Case

70. This section responds to Part VIII.D.1 of the Burtis Report. In the Singer Report, I explained that all or almost all developers would pass through to consumers at least a portion of any savings from a substantially and permanently lower take rate in a more competitive but-for world.[125] This conclusion flows from the elementary economic principle that prices depend on costs and do not depend on the specific assumptions of any particular economic model.[126] To calculate the extent

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122. Part VIII of the Burtis Report begins with VIII.D. (There are no sections titled VIII.A., VIII.B, or VIII.C).
123. Burtis Report ¶277.
124. *Id*.
125. Singer Report Part V.D.
126. *Id. See also* Jerry Hausman & Greg Leonard, *Efficiencies from the Consumer Viewpoint,* 17(3) GEORGE MASON LAW REVIEW 707, 708 (1999) ("What would be the effect on prices to consumers from the cost reduction? Economic theory makes a straightforward prediction: The decrease in cost will lead to a decrease in price, with the relationship between the decreases in cost and price depending on the shape of the demand curve.").

of pass-through, I used standard logit demand systems.[127] I did so only after confirming econometrically that the logit demand model fits the data well for the Play Store's various App categories: The price coefficients have the expected (negative) sign and are highly statistically significant; the logit demand model explains the vast majority (more than 85 percent) of the variation in the price of Apps and In-App Content.[128] My logit regressions control for extensive app-level variation, including over 200,000 App-level fixed effects.[129]

71. Dr. Burtis claims that my pass-through analysis "does not include service fees or prices,"[130] and that it "includes no analysis of any service fee rate change or any cost change[.]"[131] This is false. The pass-through rate calculation proceeds in two steps. Step one solves for the profit-maximizing *price* for a firm facing consumer demand characterized by the logit specification, taking into consideration the developers' marginal costs, including but not limited to *service fees*. In step two, the model solves for the pass-through rate, by calculating how much the profit-maximizing price will change in response to a change in marginal cost. It is therefore false for Dr. Burtis to claim that the logit demand model fails to account for developers' prices or marginal costs, both of which are incorporated in the analysis. My analysis relies on standard economic calculations showing how developers selling differentiated Apps would optimally adjust prices downward in response to a decrease in marginal costs brought about by substantially and permanently lower take rates in the competitive but-for world.[132]

72. Dr. Burtis faults the standard logit pass-through formula for its (relative) simplicity,[133] ignoring all the calculations of the optimal price and pass-through rate that underly

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127. Dr. Burtis concedes that logit demand is "frequently used in economics[.]" Burtis Report ¶306. *See also* Singer Report ¶236, n. 507; Nathan Miller, Conor Ryan, Marc Remer, & Gloria Sheu, *Approximating the Price Effects of Mergers: Numerical Evidence and an Empirical Application* DOJ Economic Analysis Group Discussion Paper 12-8 (2012), at 2 (explaining logit is one of the demand systems "that commonly are employed in antitrust analysis.") Dr. Burtis cites to a very recent (2021) publication to suggest that some academics advocate alternatives to the logit model and other standard demand systems. Burtis Report ¶307, n. 365, (citing Steven Berry & Phillip Haile, "Foundations of Demand Estimation," *in* 4(1) *Handbook of Industrial Organization* (Elsevier 2021). But even that source explains that the logit demand model is a "common parametric demand specification," and reviews the logit demand model in detail. *Id.* at 8, and at 33-35. Moreover, the "random coefficient" demand estimation methods touted by academics such as Berry & Haile (2021), *supra*, as a possible alternative to standard demand systems such as logit, suffer from well-known computational problems, which can severely limit their applicability and accuracy when applied to real-world data sets. *See*, *e.g.* Christopher Knittel & Konstantinos Metaxoglou, *Estimation Of Random-Coefficient Demand Models: Two Empiricists' Perspective* 96(1) REVIEW OF ECONOMICS AND STATISTICS 34 (2014) ("We document the numerical challenges we experienced estimating random-coefficient demand models as in Berry, Levinsohn, and Pakes (1995) using two well-known data sets and a thorough optimization design. The optimization algorithms often converge at points where the first-and second-order optimality conditions fail. There are also cases of convergence at local optima. On convergence, the variation in the values of the parameter estimates translates into variation in the models' economic predictions. Price elasticities and changes in consumer and producer welfare following hypothetical merger exercises vary at least by a factor of 2 and up to a factor of 5.")

128. Singer Report ¶¶234-240. The only exception is the "[redacted]" category, which accounts for [redacted] percent of consumer expenditures.

129. *Id*. Table 7.

130. Burtis Report ¶28.

131. *Id*. ¶277.

132. Singer Report ¶239, n. 516 (citing Nathan Miller, Marc Remer, & Gloria Sheu, *Using cost pass-through to calibrate demand*, 118 ECONOMICS LETTERS 451, 452-453 (2013)).

133. Burtis Report ¶280.

and produce a deceptively straightforward result. These calculations begin with the standard economic principle that firms set their prices to maximize profit—that is, by setting marginal revenue equal to marginal cost.[134] When marginal cost falls—due, in this case, to a substantial and permanent reduction in the take rate—developers will find that their prior prices are no longer profit-maximizing. Standard economics prescribes that developers will therefore decrease their prices until marginal revenue once again equals marginal cost.[135] When one solves for the extent of this price decrease in relation to the change in marginal costs, the result obtained from the logit demand model is that each developer will optimally decrease its price by an amount proportional to its share of revenues within the product category.[136]

73. This yields the economically intuitive result that developers with a lower market share (and thus less pricing power) will be inclined to pass through a larger proportion of a given cost decrease to consumers. For example, under the logit demand model, a developer with a market share of ten percent in a given product category has a pass-through rate of 90 percent: If marginal costs fall by $1 per transaction, the profit-maximizing response would be to lower its prices by $0.90. By aggregating across the market shares for all developers within a product category, I calculate the aggregate decrease in prices flowing from the decreased take rate that would have prevailed in the competitive but-for world.[137]

74. In faulting the standard logit pass-through formula for its (relative) simplicity, Dr. Burtis also ignores that there is nothing unusual in standard economics about pass-through calculations that boil down to (relatively) simple formulae. For example, as pointed out in the Singer Report, whenever the demand curve is assumed to be linear, the pass-through rate is always exactly 50 percent, regardless of how steep or flat the curve is.[138] For an assumed constant elasticity demand curve, the pass-through rate can also be calculated using a (relatively) simple formula.[139] As explained above, I selected the logit demand model because my econometric analysis confirms that it fits the data well.[140]

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134. Miller, Remer, & Sheu, *supra*, at 452.

135. *Id.* at 452.

136. *Id.* at 453 (Equation 6 provides the formula for inverse of the pass-through rate, multiplied by negative one, which is: $-M/[M - Q_j]$, where M is the market size and Q_j is the quantity of product j. The pass-through rate is obtained by multiplying the expression by negative one and inverting it, which yields $[M - Q_j]/M$)). Dr. Burtis concedes that the logit pass-through rates are derived, not assumed. Burtis Report ¶28.

137. For example, Table 5 of the Singer Report shows that developer savings per transaction in the In-App Aftermarket would be [redacted]. Because the pass-through rate is 89.9 percent, consumer prices would [redacted] per transaction.

138. Singer Report ¶223.

139. Miller, Remer, & Sheu, *supra*, at 452-453 (showing that constant-elasticity or "log-linear" demand curves have a pass-through rate equal to $E/(E - 1)$, where E is the demand elasticity).

140. Singer Report ¶¶234-240 (standard logit regressions show that the price coefficients have the expected (negative) sign and are highly statistically significant; the logit demand model explains the vast majority (more than 85 percent) of the variation in the price of Apps and In-App Content). In any event, no matter what demand specification one chooses—logit, linear, constant-elasticity—it would follow that all or almost all consumers would have been better off in a competitive world. The elementary economic principle that prices depend on costs does not depend on the specific assumptions of any particular economic model. Singer Report Part V.D.

75. Dr. Burtis argues incorrectly that the Play Store categories employed in my pass-through analysis, which have been used consistently by the Play Store throughout the Class Period, "are not based on any economic analysis or reasoning[.]"[141] The Play Store's categories make economic sense because they reflect economically reasonable groupings of consumer tastes for different varieties of Apps, as recognized by a range of industry participants, including Google. According to Google, [redacted][146]

76. The Play Store's categories are also used by industry analysts.[147] Developers, who presumably know their customers best, use Google's categories to sell their Apps in competition with other developers; they have clear incentives to select a meaningful category to maximize the value of their Apps.[148] If the developer of a "Parenting" App misclassified their App into the "Auto & Vehicles" category, that developer's ability to compete would likely be compromised. The evidence also shows that the Play Store's categories are economically meaningful to consumers, given their prominent display within the Play Store, and given that consumers can filter the Apps

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141. Burtis Report ¶279.

142. Play Console Help, *Choose a category and tags for your app or game, available at* https://support.google.com/googleplay/android-developer/answer/9859673?hl=en#zippy=%2Capps%2Cgames (listing each of the Play Store's categories, with a description of each).

143. GOOG-PLAY-000294117.R at GOOG-PLAY-000294118.R (emphasis added). The survey, of users in Japan, [redacted]

144. GOOG-PLAY-000076773 at GOOG-PLAY-000076785 ([redacted]); GOOG-PLAY-000076766 (cover email noting that [redacted]).

145. GOOG-PLAY-000579868.R at GOOG-PLAY-000579870.R, GOOG-PLAY-000579878.R.

146. GOOG-PLAY-000303918.R at GOOG-PLAY-000303926.R, GOOG-PLAY-000303930.R.

147. *See, e.g.,* David Curry, *App Data Report,* BUSINESS OF APPS (2022) at 10 (chart showing Google Play categories by volume); *see also* SENSOR TOWER, *2021 – 2025 Mobile Market Forecast,* (2021) at 39, *available at* go.sensortower.com/rs/351-RWH-315/images/Sensor-Tower-2021-2025-Market-Forecast.pdf (showing projected consumer spending for top categories, including Games, Social, Entertainment, Comics, Productivity, and Health & Fitness); STATISTA, *Most popular Google Play app categories as of 1st quarter 2021, by share of available apps, available at* https://www.statista.com/statistics/279286/google-play-android-app-categories

148. Play Console Help, Choose a category and tags for your app or game, *supra* ("**Choose a category and tags for your app or game** You can choose a category and add tags to your app or game in Play Console. Categories and tags help users to search for and discover the most relevant apps in the Play Store. Users can view apps by using a browser and the Google Play app.") (emphasis in original).

displayed to them based on the Play Store categories.[149] Apple's App Store uses a similar set of categories, as seen below:

149. *See* Google Play Store, *Apps, available at* https://play.google.com/store/apps (click on drop-down menu).

TABLE 2: COMPARISON OF PLAY STORE AND APP STORE CATEGORIES

Play Store Category Name	**App Store Category Name**
Art and Design	Graphics and Design
Auto & Vehicles	N/A
Beauty	Lifestyle
Books & Reference	Books/Reference
Business	Business
Comics	Books
Communications	Social Networking
Dating	Social Networking
Education	Education
Entertainment	Entertainment
Events	Entertainment
Finance	Finance
Food and Drink	Food and Drink
Games	Games
Health and Fitness	Health and Fitness
House & Home	Lifestyle
Lifestyle	Lifestyle
Maps & Navigation	Navigation
Media & Video	Photo and Video
Medical	Medical
Music and Audio	Music
News and Magazines	Magazines and Newspapers/News
Parenting	Lifestyle
Personalization	Graphics and Design/Utilities
Photography	Photo and Video
Productivity	Productivity
Shopping	Shopping
Social	Social Networking
Sports	Sports
Tools	Utilities/Developer Tools
Transportation	Navigation/Travel
Travel & Local	Travel
Video Players & Editors	Photo and Video
Weather	Weather

Note: Separation of category name by "/" implies that the Play Store category could encompass multiple App Store categories.
Sources: https://developer.apple.com/app-store/categories/ ; Singer Report Table 7.

77. Although the logit demand system incorporates market shares, it bears emphasis that this need not be shares of a relevant antitrust product market. As DOJ economist Gregory Werden has observed, the market used in a logit demand system "may be more or less inclusive than a

relevant antitrust market."[150] The logit demand model also does not imply that all products in the market are interchangeable, but instead allows for product differentiation.[151] Products that are more attractive to most consumers (and thus have higher market shares) command more pricing power than less-attractive products with lower market shares.[152] What the logit demand system does imply is that developers in a given category pass through cost savings according to their dominance (or lack thereof) in the category, as measured by their market share within that category. For example, if Microsoft, which sells both Word and Excel, dominates the productivity category with its Microsoft 365 package (formerly known as Office, a bundle of Word, Excel, and PowerPoint), Microsoft is predicted to pass through a smaller portion of any cost reduction, all things equal. It is reasonable to assume that Microsoft 365 is a substitute for Google's bundle of productivity apps called Google Workspace. Both Microsoft 365 and Google Workspace are included in Google's "Productivity" category.

78. Although there is no requirement that the market share for the logit demand model be computed in a relevant antitrust market, it bears noting that antitrust has recognized "cluster markets," in which the market is comprised of items that are not always substitutes. As antitrust scholar Herbert Hovenkamp has noted, cluster markets have aggregated products as diverse as office supplies.[153] In a cluster market, a hypothetical monopolist over (say) paperclips, staples, paper, and other office supplies can profitably raise prices above competitive levels, given that many customers are likely to purchase many or all of their office supplies from the same source. By the same logic, a hypothetical monopolist over games ranging from "Thomas and Friends" to "Poker – Texas Hold'em" could also likely wield monopoly power, given that many households likely "need or at least prefer the convenience of"[154] purchasing games for all members of the family from the same source.

79. Even if one assumes that the "Games" category is overly broad, the same common methodology from the logit model can be used to calculate pass-through based on Google's seventeen subcategories of Games,[155] as Dr. Burtis concedes by performing the calculation

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150. Gregory Werden & Luke Froeb, *The Antitrust Logit Model For Predicting Unilateral Competitive Effects* 70 ANTITRUST LAW JOURNAL 257 (2002). Economists make use of market shares in industries that may not perfectly correspond to an antitrust product market. *See, e.g.*, José Azar, Ioana Marinescu & Marshall Steinbaum, *Labor Market Concentration*, 57(3) JOURNAL OF HUMAN RESOURCES (2020) (finding that variation in wages could be explained by measures of labor market concentration within an occupational code using vacancy shares from CareerBuilder.com).

151. Gregory Werden & Luke Froeb, *The Effects of Mergers in Differentiated Products Industries: Logit Demand and Merger Policy* 10(2) JOURNAL OF LAW, ECONOMICS, & ORGANIZATION 407, 408 (1994) ("the logit model has direct policy relevance, since the 1992 Horizontal Merger Guidelines use it as the base case for the analysis of mergers in differentiated products industries.").

152. *Id.* at 410 (equation (3) shows that the own price elasticity for a given product (ε_j) decreases with the market share (π_j)).

153. Herbert Hovenkamp, *Digital Cluster Markets,* COLUMBIA BUSINESS LAW REVIEW at 31 (forthcoming 2022), *available at* https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3820062 ("In the *Staples* merger case, the court defined a cluster market…The expert concluded 'that a *monopoly* provider of consumable office supplies would charge significantly more to large customers than Staples and Office Depot today charge these same customers.'").

154. *Id.* at 7.

155. The seventeen subcategories are Action, Adventure, Arcade, Board, Card, Casino, Casual, Educational, Music, Puzzle, Racing, Role Playing, Simulation, Sports, Strategy, Trivia, and Word. *See* Google Play Store, Choose a category and tags for your app or game, *available at* https://support.google.com/googleplay/android-developer/answer/9859673?hl=en.

herself.[156] This approach is overly granular, as it assumes (for example) that action games are not substitutes for adventure games, that card games are not substitutes for board games, and so on. In any case, this approach would yield an overall weighted average pass-through rate of [redacted], compared with an 89.9 percent pass-through rate in the Singer Report.[157] If this alternative pass-through rate of [redacted] is used, my economic models would continue to show classwide impact and damages, with only minor differences in the but-for take rates.[158]

2. Dr. Burtis's Pass-Through Analysis Is Incapable Of Reliably Measuring Pass-Through In A But-For World In Which All Or Almost All Developers Enjoy Permanently And Substantially Lower Take Rates

80. In Part VIII.D.1 of the Burtis Report, Dr. Burtis asserts that the pass-through rates from my standard economic models are incorrect based on her flawed "pass-through" analysis, to which I respond in Part IV below. Dr. Burtis also presents examples of Apps that charge the same price when purchased through the App website or through the Play Store.[159] As explained in Part I.C.1 above, this ignores the anti-steering restrictions that explicitly prevent developers from directing customers inside the Play Store to lower-cost options outside the Play Store. An App that charges the same price within the Play Store and on its website has simply not adopted a steering strategy in the actual world.

3. Dr. Burtis's Claim That My Pass-Through Analysis Is "Not Consistent With Economics" Is Without Merit

81. In Part VIII.D.3 of the Burtis Report, Dr. Burtis repeats the incorrect claims that my pass-through analysis does not account for marginal cost and that some (unspecified) developers might have zero marginal costs. I have responded to these claims in Parts I.B.1 and II.A.1 above. Dr. Burtis also argues that a calculation I provided to illustrate the economics of pass-through is inconsistent with the standard logit demand model that I employed to quantify pass-through in the but-for world.[160] Dr. Burtis is wrong. The calculation in question is based on the elementary economic principle that a profit-maximizing firm selling a single product will set its price based on the inverse of the elasticity of demand for that product.[161] That same principle of profit-maximization applies (albeit in a multi-product setting involving tens thousands of developers making

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156. Burtis Report ¶312; Exhibit 55.

157. Within the Games category, the weighted average pass-through rate declines from [redacted].

158. Using a [redacted], the but-for take rate in the Android App Distribution Market is [redacted], which differs by only one tenth of a percentage point from the but-for take rate of [redacted] calculated in Table 3 of the Singer Report. Using a [redacted] the but-for take rate in the In-App Aftermarket is [redacted] percent, which differs by only three tenths of a percentage point from the but-for take rate of [redacted] percent reported in Table 5 of the Singer Report. Aggregate damages in the Android App Distribution Market using a [redacted] percent pass-through rate come to [redacted], compared with [redacted] calculated in Table 3 of the Singer Report. Aggregate damages in the In-App Aftermarket using a [redacted] percent pass-through rate come to [redacted] compared with [redacted] calculated in Table 5 of the Singer Report.

159. Burtis Report ¶297; Table 8.

160. Burtis Report ¶¶299-305.

161. Singer Report ¶224. *See also* William Landes & Richard Posner, *Market Power in Antitrust Cases,* 94(5) HARVARD LAW REVIEW 937 (1981).

interdependent pricing decisions) when the logit demand model is used to calculate the pass-through rate.[162]

4. Dr. Burtis's Claim That the Basis for My Pass-Through Analysis Is "Fundamentally Flawed" Is Without Merit

82. In Part VIII.D.4 of the Burtis Report, Dr. Burtis repeats meritless critiques of the standard economic methods I employed to estimate pass-through. I have already responded to these claims in Part II.A.1 above. In addition, Dr. Burtis claims that my overall pass-through rate "mask[s] variation."[163] Yet I calculate pass-through rates for each of the Play Store's categories, display them in the same table as the overall pass-through rate (Table 8 of the Singer Report), and use the category-by-category pass-through rates to perform illustrative damages calculations (Tables 13-14 of the Singer Report).

83. Dr. Burtis also argues that my category-level pass-through rates "mask variation" because the pass-through rates are a weighted average of the pass-through rates across all of the developers within a given category.[164] Indeed, Dr. Burtis asserts that any analysis would be unacceptable unless it took into account individual idiosyncrasies associated with each consumer, developer, App, and each item of In-App Content.[165] This ignores Google's highly uniform and formulaic take-rate structure built from a standard headline rate of 30 percent, as well as the Challenged Conduct, which imposes uniform restrictions on all developers, Apps, subscriptions, and In-app Content. All of this justifies a category-wide approach, including using a weighted average of the developer-specific pass-through rates within a given category from my standard logit demand model. It bears emphasis that Dr. Burtis concedes (for purposes of her analysis here) the relevant markets as they are defined in the Singer Report,[166] which further justifies a market-wide economic analysis when calculating but-for headline rates in the Android App Distribution Market and In-App Aftermarket. In any event, if the factfinder requires App-specific pass-through rates for the allocation of damages at the merits phase, I have provided a model that can perform that precise task.

5. Dr. Burtis's Claim That My Pass-Through Rates Are Unreliable Is Without Merit

84. In Part VIII.D.5 of the Burtis Report, Dr. Burtis repeats her claim that developers would avoid charging prices that do not end in "99" in the competitive but-for world.[167] I have responded to this claim in Part I.B.2 above. Dr. Burtis also asserts that the pass-through rates from the standard logit demand model are "not credible because, in some instances, the rates change month to month as shares change month to month."[168] Dr. Burtis is wrong. *First*, I am not offering an opinion on any developer's pass-through rate for a specific month (or week, or day). As explained

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162. Miller, Remer, & Sheu, *supra*, at 452-453.
163. Burtis Report ¶312.
164. *Id.* ¶312.
165. *Id.* Part IV.A; ¶¶103-104; ¶307.
166. *Id.* ¶¶42-43.
167. Burtis Report ¶¶313-315.
168. *Id*. ¶316.

above, the but-for world is based on a long-run equilibrium of substantially and permanently lower take rates. *Second*, the examples presented in Figure 14 of the Burtis Report are cherry-picked. When I apply standard econometric methods to the entire data set, the results demonstrate that the month-specific pass-through rates deviate from the time-averaged pass-through rates by an immaterial 2.0 percentage points on average.[169]

6. Dr. Burtis Claims Incorrectly That Determining Pass-Through Rates Requires an Individualized Analysis

85. In Part VIII.D.6 of the Burtis Report, Dr. Burtis asserts that individualized analysis is necessary because my pass-through model yields different results when compared to Dr. Williams's pass-through model.[170] The question of whether my pass-through rate is consistent or inconsistent with Dr. Williams's analysis has no bearing on whether individualized analysis is required. In any case, as I explain in Part IV below, Dr. Williams's pass-through analysis is not reliable.

B. Dr. Burtis's Rebuttals to My Economic Analysis of But-For Take Rates Are Without Merit

86. In this section, I respond to Part VIII.E of the Burtis Report. Dr. Burtis argues incorrectly that I assume Google chooses a single uniform take rate without exception.[171] As I explained in Part II.A.1 above, although Google's take-rate structure is highly uniform and formulaic, my analysis does not assume a uniform take rate across all developers in a more competitive but-for world. Instead I use standard economic methods to solve for a competitive but-for *headline* rate, which tracks Google's highly uniform and formulaic take-rate structure in the actual world built around a headline rate of 30 percent. I have also shown that damages can be calculated for individual Class members using common methods, even after taking into account the limited number of developers who received discounts relative to Google's standard 30-percent take rate.[172]

87. Dr. Burtis suggests incorrectly that my two-sided market does not make prices on both sides of the platform "part of the same equilibrium decision."[173] In fact, prices on both sides of the market are taken into account in my models: In the Singer Report, I implemented two-sided market models in which the price on one side of the market is held constant (*not* ignored), while

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169. This result is obtained by regressing the logit pass-through rates on App fixed effects. The standard deviation of the residuals (or the root mean squared error) of the regression is 0.020.

170. Burtis Report ¶¶317-322.

171. *Id.* ¶332.

172. Singer Report ¶177, n. 376; *see also* Singer Report Part VII.

173. Burtis Report ¶331, n. 396.

solving for the optimal price on the other side of the market.[174] In any case, classwide impact and damages can also be demonstrated by implementing models that simultaneously solve for optimal prices on both sides of the market, with results similar to those in the Singer Report.[175]

1. My Analysis of But-For Take Rates Uses Standard Economic Models and Does Not Assume Classwide Impact

88. In Part VIII.E.1 of the Burtis Report, Dr. Burtis claims that my analysis "treats all developers as if they are all the same."[176] This is false. As I explained in Part II.A.1 above (and immediately above), I do not assume that all developers would be subject to a uniform take rate in the but-for world. Nor do I assume that all developers would have had the same pass-through rate: As I explain in Parts I.B and II.A above, I use standard economic methods to estimate equilibrium pass-through rates for thousands of developers making thousands of interdependent decisions for each of their Apps, taking into account prices, marginal costs, and other developer-specific characteristics. Dr. Burtis also reiterates the incorrect claim that developers selling at a price of $0.99 would have been worse off in the but-for world.[177] I have responded to this claim in Part I.A.2 above.

2. Dr. Burtis's Critiques of the Inputs to My Standard Economic Models Are Without Merit

89. In Part VIII.E.2 of the Burtis Report, Dr. Burtis criticizes the standard economic models that I employ because they rely on aggregate inputs.[178] Dr. Burtis ignores that standard economic models commonly rely on aggregate inputs. For example, a textbook "supply and demand model" uses aggregate data on demand shifters (e.g. median income), and supply shifters (e.g., an index of the price of raw materials) to determine a market-clearing price that may apply to thousands (or millions) of heterogeneous consumers.[179] Dr. Burtis also ignores that aggregation is both pervasive and economically necessary in the markets at issue here: Google's highly uniform and formulaic take rate structure, based on a common 30 percent headline rate, is applied to tens of

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174. In the Singer Report, equation (V.5), which forms the basis for the presentation of the two-sided market model in Section V.B and Appendix 4 of the Singer Report, gives a competitive equilibrium condition that includes both buyer-side prices (P_B) and the seller-side take rate (t), as well as both buyer- and seller-side elasticities. By way of pass-through, consumers are necessarily affected in these models by the adjustment of the take rate to a competitive level, a feature that my modeling accounts for. Equation (V.12), which forms the basis for the presentation of the two-sided market model in Section V.E, also gives a competitive equilibrium condition that includes both the buyer-side price (P_B) and a seller-side take rate (t), thereby taking both sides into account when solving for the but-for buyer-side subsidy.

175. When I solve simultaneously for optimal prices on both sides of the market, the model shows that the Play Points buyer-side subsidy would be [redacted] to [redacted] per transaction (approximately [redacted] percent of consumer spend), [redacted] from [redacted] per transaction in the actual world. The but-for take rate is [redacted] percent, [redacted] from [redacted] percent in the actual world. The combined effect of a higher buyer-side subsidy and a lower take rate yields aggregate damages to the Class of [redacted]. By way of comparison, if the take rate is held constant and the buyer-side subsidy is permitted to vary, aggregate damages are [redacted]. *See* Singer Report Table 12. If the buyer-side subsidy is held constant and the take rate is permitted to vary, aggregate damages are [redacted] *Id.*

176. Burtis Report ¶337.

177. *Id.* ¶338.

178. *Id.* ¶¶339-342.

179. JEFFREY WOOLDRIDGE, INTRODUCTORY ECONOMETRICS: A MODERN APPROACH, 552-555 (THOMPSON 4TH ED. 2009).

thousands of heterogeneous developers. It would be economically inefficient for Google to negotiate individually with each of them, so Google sets a highly uniform market pricing structure instead.

90. In the Singer Report, I examined the market shares of historically dominant firms that went on to face some degree of competition in different industries.[180] Based on this evidence, I assumed conservatively that in a competitive but-for world Google would retain a substantial market share of 60 percent in the In-App Aftermarket and in the Android App Distribution Market, given its incumbency advantage and network effects. This was approximately AT&T's market share in the long-distance market after competitive entry, and it is substantially above the market share of Visa in e-commerce or of Alcoa in aluminum manufacturing.[181] Dr. Burtis argues incorrectly that there is no evidence that AT&T provides a valid competitive benchmark for Google.[182] Dr. Burtis is wrong. She ignores that AT&T was a classic network monopolist that leveraged monopoly power in the (ancillary) long-distance market from its monopoly in local service, before eventually being forced to open the long-distance market to competition—just as Google is a network monopolist that leveraged its power in the Android App Distribution Market into the In-App Aftermarket Services Market.[183]

91. Dr. Burtis also ignores that my selection of a 60 percent but-for market share was informed by market shares in other industries, including e-commerce.[184] Here I present evidence from additional industries confirming that my 60 percent estimate is, if anything, likely conservative. Netflix, which made streaming video on demand (SVOD) a staple of home entertainment, dominated the market for streaming video services for years.[185] As recently as 2014, approximately nine out of every ten SVOD households were Netflix subscribers.[186] More recently, Netflix's market share has eroded as competitors such as Amazon Prime, HBO Max, and others have gained at its expense.[187]

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180. Singer Report ¶¶216-219.

181. Visa is an historically dominant global payments technology company. Alcoa is historically dominant in aluminum manufacturing. *See, e.g.,* STATISTA, Market share of global general purpose card brands American Express, Diners/Discover, JCB, Mastercard, UnionPay and Visa from 2014 to 2020, based on number of transactions, *available at* https://www.statista.com/statistics/278970/share-of-purchase-transactions-on-global-credit-cards/; *see also* Singer Report ¶¶216-219.

182. Burtis Report ¶345.

183. Dr. Burtis offers only a single argument as to why AT&T does not represent such a benchmark, claiming that AT&T's market share would have "likely varied across geography." Burtis Report ¶346, n. 411. Dr. Burtis offers no support for her claim, nor does she explain why it is relevant here.

184. Singer Report ¶¶216-219.

185. *See, e.g.,* James Brumley, *Netflix is Losing Market Share, but This is the Actual Risk to Shareholders*, THE MOTLEY FOOL, Apr. 25, 2021, *available at* https://www.fool.com/investing/2021/04/15/netflix-is-losing-market-share-but-thats-not-the-a/ ("Netflix (NFLX -1.73%) is losing market share to be sure -- but consider the circumstances. It was the first company to make streaming video a mainstream phenomenon, and for years, it was the only serious name in the business. It's only natural that the recent launches of big rival services such as Disney's (DIS 0.00%) Disney+ and AT&T's (T 1.73%) HBO Max would chip away at Netflix's share of the on-demand video space.").

186. Nielsen, *The Total Audience Report Q4 2014*, at 5, *available at* https://www nielsen.com/wp-content/uploads/sites/3/2019/04/total-audience-report-q4-2014.pdf (showing 40.3 percent of US TV households with SVOD, and 36 percent of US TV households subscribing to Netflix).

187. Georgina Tzanetos, *Netflix Loses 31% Market Share as Streaming Rivals Gain Loyal Subscribers*, YAHOO!, (April 7, 2021), *available at* https://www.yahoo.com/video/netflix-loses-31-market-share-204537722 html.

As seen below, as of Q4 2021, Netflix had a streaming share of just 25 percent, compared to Amazon Prime's 19 percent, Disney + and Hulu at 13 percent each, and HBO Max at 12 percent.[188]

92. The personal computer (PC) market has also seen dominant firms lose substantial share. The IBM brand was nearly synonymous with the industry for decades. However, competition from other PC makers such as Compaq and Apple Computer dissipated IBM's market share, which fell from 80 percent to 20 percent in the decade between 1982 and 1992.[189] In 2004, IBM sold its personal computer business to Lenovo, which maintained a 24.6 percent worldwide market share in 2021, compared to 21.1 percent for HP, 19.5 percent for Dell, and around 7 percent each for Apple, Acer, and ASUS.[190]

93. Competitive entry in the Internet browser market eroded the market share of Microsoft's Internet Explorer. In 2004, Internet Explorer enjoyed 95 percent market share.[191] By June 2010, its market share had slipped to 53.8 percent, as Firefox (30.6 percent), Apple Safari (6.8 percent), Google Chrome (5.7 percent) competed for users.[192] Recently, Google Chrome has supplanted Microsoft's browser offering (now called Edge) at the top of the market, with a usage share of 65 percent of all browsers, compared to 19 percent for Safari and only 4 percent for Edge.[193]

94. In summary, ample evidence from a range of industries, including network industries where market power was leveraged from the core into an ancillary market (AT&T and Microsoft), supports my conclusion that Google's share of payment processing would decrease substantially in the competitive but-for world. If anything, the evidence shows that 60 percent is likely a conservative estimate of Google's market share after competitive entry.

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188. Joe Wituschek, *Apple TV+ gains market share in the United States while Netflix loses it*, JUSTWATCH, Jan. 24, 2022, *available at* https://www.imore.com/apple-tv-gains-market-share-united-states-while-netflix-loses-it. *See also* Brumley, *supra* ("Data from market intelligence outfit eMarketer lets us fleshes out this trend with some numbers. It reports that Netflix secured 36.2% of the U.S. over-the-top television industry's revenue in 2020, down from 44.4% in 2019. By 2022, its share is expected to be down to 28.4%, and almost even with Disney's slice of the U.S. streaming market.").

189. James W. Cortada, *How the IBM PC Won, Then Lost, the Personal Computer Market - Not even Big Blue could keep up with its creation's success*, IEEE SPECTRUM, July 21, 2021, *available at* https://spectrum.ieee.org/how-the-ibm-pc-won-then-lost-the-personal-computer-market.

190. Gartner Press Release, Gartner Says Worldwide PC Shipments Declined 5% in Fourth Quarter of 2021 but Grew Nearly 10% for the Year, Jan. 12, 2022, *available at* https://www.gartner.com/en/newsroom/press-releases/2022-01-12-gartner-says-worldwide-pc-shipments-declined-5-percent-in-fourth-quarter-of-2021-but-grew-nearly-10-percent-for-the-year.

191. TheCounter.com, Browser Stats, April 2004, *archived at* https://web.archive.org/web/20111101195133/http://www.thecounter.com/stats/2004/April/browser.php.

192. AT INTERNET INSTITUTE, Are we heading towards the end of Internet Explorer's reign in Europe?, July 27, 2010, *archived at* https://web.archive.org/web/20100806153329/http://www.atinternet-institute.com/en-us/browsers-barometer/browser-barometer-june-2010/index-1-2-3-205 html.

193. STATCOUNTER GLOBALSTATS, Browser Market Share Worldwide, October 2021, *available at* https://gs.statcounter.com/browser-market-share#monthly-202110-202110-bar.

3. My Standard Economic Models Show a Reasonable and Expected Relationship Between Competition and Lower Prices

95. In Part VIII.E.3 of the Burtis Report, Dr. Burtis critiques my standard economic models because they "find any change in competition leads to lower rates for all developers."[194] Yet the relationship between competition and prices is foundational to antitrust and economics. Dr. Burtis also claims that my models predict that "if, absent the alleged conduct, Google Play's market share fell by a single percentage point, the rate for all developers' IAPs would [redacted] [percentage] points ([redacted])."[195] Dr. Burtis obtains this result by assuming counterfactually that the Play Store faces robust competition from rivals, such that the Play Store must drop its take rate substantially to prevent its rivals from expanding.[196] In the actual world, the Challenged Conduct precludes such competition. If Dr. Burtis's assumption is removed, reducing Google's market share by one percentage point causes the take rate to fall by just [redacted] percentage points.[197]

96. In this section, Dr. Burtis reiterates her incorrect argument that Google would reduce its take rate only in a targeted fashion in the face of robust and widespread competition in the but-for world.[198] I have responded to this claim in Part I.A.1 above.

4. Dr. Burtis's Speculations Regarding Alternative Monetization Strategies Are Not Appropriate To Include In My Economic Models

97. In Part VIII.E.4 of the Burtis Report, Dr. Burtis reiterates her incorrect claims regarding alternative monetization strategies. I have already responded to these claims in Part II.B.4 above.

III. DR. BURTIS'S CRITIQUES OF MY ANALYSIS OF PLAY POINTS ARE WITHOUT MERIT

98. In this Section, I respond to the arguments set forth in Part IX of the Burtis Report, in which Dr. Burtis criticizes an alternative model of impact and damages that I presented that works through direct consumer subsidies.[199] Dr. Burtis argues that I failed "to consider that Google's Play Points program provides benefits to [redacted] of U.S. consumers,"[200] as "[redacted] of U.S. consumers participated in the program and [redacted] of U.S. consumers earned and redeemed Play Points."[201] That [redacted] of U.S. consumers participated in Play Points in the actual world—when the benefits of Play Points are comparatively meager—is hardly

194. Burtis Report ¶¶347-349.
195. *Id.* ¶¶348.
196. Specifically, Dr. Burtis sets the elasticity of supply of Google's would-be rivals to the same value used to model the competitive but-for world ($E_s = 4.38$). *See* Singer Report ¶216.
197. Specifically, if one sets the elasticity of rival supply to zero, ($E_s = 0$) and reduces the Play Store's market share by one percentage point, then the take rate falls by [redacted] percentage points in the In-App Aftermarket. *See* Singer Report Table 5. Dr. Burtis concedes that the Android App Distribution Market is not sensitive to her proposed adjustment; reducing Google's market share by one percentage point in the Android App Distribution Market lowers the take rate by just [redacted] percentage points, to [redacted] percent. Burtis Report ¶348.
198. Burtis Report ¶349.
199. Singer Report ¶¶245-256.
200. Burtis Report ¶358.
201. *Id.*

evidence that participation in a more competitive but-for world would not be substantially greater. In addition, that [redacted] about [redacted] percent[202] of those who participated earned and redeemed Play Points in the actual world does not prove that a more generous program would not see more widespread redemptions. Consumers would have enhanced economic incentives to enroll and participate in a Play Points offering more valuable incentives in the but-for world, just as consumers have more incentives to participate in a more generous credit card rewards program than a less generous one. In a more competitive but-for world, Google would also be incentivized to facilitate consumer participation in Play Points. For example, consumers could be automatically enrolled in Play Points. Discounts could be automatically redeemed at the point of purchase or even dispensed through a "cash-back" program.[203]

99. Dr. Burtis also assumes incorrectly that Play Points that are not redeemed have no value. This is incorrect for at least two reasons. *First*, Play Points that have not yet been redeemed today may still be redeemed in the future—in other words, they have an intrinsic option value. *Second*, that different consumers may value Play Points differently does not make them worthless. A $10 gift card for Chick-Fil-A may be worth considerably more to some than others, just a jar of change accumulating in the closet might be worth more to some consumers than others. That different consumers may place different values on points, gift cards, or even money does not imply that they lack economic value.

IV. NEITHER DR. BURTIS NOR DR. WILLIAMS PROVIDES A RELIABLE ANALYSIS OF PASS-THROUGH IN A MORE COMPETITIVE BUT-FOR WORLD

100. Drs. Burtis and Williams both claim to have implemented pass-through analyses that purport to estimate the change in the prices that developers would charge consumers for Apps or In-App Content as a result of a change in developers' costs arising from a change in Google's take rate.[204] As detailed below, neither Dr. Burtis nor Dr. Williams provides a pass-through analysis capable of reliably measuring the effects of the substantially and permanently lower take rates for all or almost all developers that would prevail in a more competitive but-for world where Google's anticompetitive restraints were absent. Both pass-through analyses are unreliable, biased, and virtually guaranteed to underestimate pass-through in a competitive but-for world that offers developers an opportunity to steer customers to lower-cost app stores or payment processors. No "corrections" to their methods could produce reliable pass-through estimates, given that no data exist to directly measure pass-through in the absence of the Challenged Conduct, which still remains in place.

101. Real-world examples of pass-through also undermine the pass-through analysis of Drs. Burtis and Williams. Certain developers such as [redacted] have been able to [redacted]; other developers (including [redacted]) have adopted

202. Equal to [redacted percent].

203. *See, e.g.,* Discover, Discover it Cash Back Card, *available at* https://www.discover.com/credit-cards/cash-back/it-card html

204. Burtis Report ¶¶173-178; ¶¶280-295; Table 5, Figure 13, Exhibits 35-36, Exhibits 48- 52; Williams Report ¶¶76-88; ¶¶111-124.

a similar strategy with respect to Apple's App Store. The implied pass-through rates from these real-world examples of pass-through are far above the estimates of Drs. Burtis and Williams, even when pass-through is calculated conservatively.[205]

A. Review of Dr. Burtis's and Dr. Williams's Pass-Through Analyses

102. Below I briefly review the pass-through analyses presented by Drs. Burtis and Williams. I also highlight significant flaws in their analysis that are evident from this review, and which preview some of my broader critiques in later sections.

1. Dr. Burtis's Pass-Through Analysis

103. Dr. Burtis's pass-through analysis is based on a comparison of prices for three groups of developers, grounded in three episodes in which take rates were modified: (1) the Play Store's 2018 take-rate reduction for subscription developers; (2) the Play Store's mid-2021 take-rate reduction for the first $1 million in developer revenue; and (3) take-rate reductions for special programs such as [redacted] which granted take rate discounts to a limited number of high-profile developers such as [redacted] that Google was attempting to attract for "living room" based-Android devices.[206] For each of these groups, Dr. Burtis compares the price of the App (or In-App Content) one month before and one month after the take-rate decrease, and concludes there is evidence of pass-through only if the latter price is lower than the former price.[207] Dr. Burtis also compares prices six months before and six months after the take rate decrease.[208] Dr. Burtis's pass-through analysis therefore ignores the long-run effects of lower take rates by construction.[209] Dr. Burtis provides no economic basis for restricting her analysis to one month (or six). These time horizons are brief, compared to a more competitive but-for world in which the Challenged Conduct is absent for all relevant time periods. This error is compounded by the fact that a decrease in the take rate does not immediately flow through to a developer's financials. For example, if a developer's take rate falls from 30 percent to 15 percent in a given month, the developer's average take rate over the prior year is approximately [redacted].[210]

104. Dr. Burtis offers three cherry-picked examples (out of tens of thousands of developers) involving time horizons of more than six months.[211] In 2018, the Play Store decreased

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205. Singer Class Report ¶¶242-243; Table 9 (showing real-world pass-through rates ranging from [redacted] percent).

206. Burtis Report ¶174. Only one tenth of one percent of the proposed developer class qualified for any of these special programs. *See* Part I.A.1, *supra.*

207. *Id.* ¶176; Table 5; Exhibit 36. When comparing the price of In-App purchases, Dr. Burtis uses a time horizon of four to eight months. *See* Burtis Report Exhibit 36, n. [2] ("Price changes for IAPs are identified by comparing prices in June 2021 to average prices in October 2021 and February 2022. Price changes for 'Scraped Data' SKUs are identified by comparing the retail prices in the scraped data in the month before and the month after the rate change occurred. Price changes for all other purchase types are identified by comparing weighted average net prices in the month before the rate change occurred to the month after.")

208. *Id.* ¶293; Exhibit 50.

209. Despite this limitation, Dr. Burtis finds that approximately [redacted] percent of initial downloads saw their prices decrease within six months of a decrease in the take rate. *See* Burtis Report Exhibit 50.

210. Note that [redacted].

211. Burtis Report ¶¶280-288 (showing subscription prices and take rates for [redacted], and [redacted]).

take rates for developers offering subscription services in which the subscriber maintained their subscription for at least twelve continuous months.[212] Unlike the vast majority of subscription products, the take rates for these three cherry-picked examples ([redacted], and [redacted]) dropped from 30 percent to 15 percent shortly after January 2018 because the products are annual renewals for *existing* subscribers only.[213]

105. Searching for pass-through among these specialized products makes little economic sense, because it runs contrary to the elementary economics of subscription pricing, which incentivizes "front-end" discounts to *new* customers.[214] Pass-through cannot be reliably measured by searching for "back-end" discounts offered to subscription developers' *least* price-sensitive consumers (renewals for existing customers).[215]

106. In addition, even if developers had an economic incentive to offer discounts to their least price sensitive customers, Google's developer pricing policies would have made doing so difficult (if not impossible) for most developers. As detailed below, the Play Store's developer pricing interface made it difficult or impossible for most developers even to implement "back-end" discounts for existing customers.[216]

107. Moreover, the data show low and declining transaction volume for Dr. Burtis's cherry-picked products, indicating they are not representative of stable product offerings that would drive developer pricing decisions in a more competitive but-for world.[217]

2. Dr. Williams's Pass-Through Analysis

108. Dr. Williams's pass-through methodology hinges on what he claims is a "natural experiment" created by Google's decision to lower the take rate from developers with subscription Apps from 30 to 15 percent beginning in January 2018—with the [redacted] percent take rate applied only

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212. *Id.* ¶174, n. 193 ("In 2018, Google reduced the service fee rate on subscription IAPs when the consumer's subscription extended beyond a year.")

213. *Id.* Figures 10-12; ¶282, n. 337 ("When Google initiated the program and throughout the period [redacted] sold subscriptions in its [redacted] app, consumer subscriptions apparently are annual renewals. Thus, its service fee rate dropped from 30% to 15% immediately after Google made the service fee rate reduction and continued to be 15% throughout the time it sold subscriptions.").

214. *See* Part IV.D below.

215. *See* Part IV.D below.

216. *See* Part IV.E below.

217. For example, the cherry-picked [redacted] *See* Appendix Figures A1-A3.

to customers with a subscription in place for at least twelve continuous months.[218] Based on his "natural experiment" comparing prices in a "control group" to prices in a "treatment group" using a difference-in-differences ("DID") regression, Dr. Williams concludes that "the overall pass-through rate is minimal, no greater than [redacted]."[219] Dr. Williams implements a difference-in-difference ("DID") regression that attempts to measure the decrease in the average price charged by developers in a "treatment group," relative to a "control group."[220] Dr. Williams claims his "treatment group" consists of "subscription products" that "received the 15% service fee after January 1, 2018."[221] Dr. Williams asserts his "control group" consists of "subscription products" whose take rates remained fixed at 30 percent.[222]

109. Dr. Williams's DID regression purports to measure the extent to which monthly prices in the "treatment group" diverged from monthly prices in the "control group" after the start of the "treatment period," defined as the 42 months from January 2018 through June 2021.[223] The DID regression includes fixed effects for each "product."[224] Accordingly, Dr. Williams's DID regression measures pass-through only to the extent that prices of the "products" in the "treatment group" decline during the "treatment period," relative to prices of the "products" in the "control group."[225]

110. To obtain what he terms "clean effects of the treatment," Dr. Williams discards all "products" from his "treatment group" that do not have take rates of exactly 15 percent after 2017.[226] Similarly, he discards all "products" in the "control group" that do not have take rates of exactly 30 percent.[227] Dr. Williams's "treatment group" accounts for just [redacted] percent of the revenue of the developers he purports to analyze during his "treatment period." Dr. Williams's "treatment group" and "control group" together account for just [redacted] percent of the revenue of the developers

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218. Williams Report ¶¶75, 77 ("[O]n January 1, 2018 Google began charging a 15% service fee for subscriptions lasting more than one year[.]"). *See also* GADGETS 360, *Google Play Lowers App Subscription Fee to 15 Percent, Matches Apple's Offering*, Oct. 20, 2017, *available at* "https://gadgets360.com/apps/news/google-play-app-subscription-fee-30-percent-to-15-1764923 ("Google said this week it is lowering the amount of money it charges app developers for mobile subscriptions processed through the Google Play app store from 30 percent to 15 percent in a move to better compete with Apple's offering for iOS developers. Developers will be able to make use of the price revision, which goes into effect beginning January 2018, only among their customers who have subscribed to their app for a year. So, for the first year, Google will still take a 30 percent cut on the mobile subscription transactions, the company clarified. This is the same policy Apple employs for auto-renewed paid apps.").

219. Williams Report ¶75; ¶¶84-88; ¶¶111-124.

220. *Id.* ¶86.

221. *Id.*

222. *Id.*

223. Dr. Williams limits his analysis to this time period because, beginning in July 2021, Google introduced a new policy lowering take rates to 15 percent for developers' first $1 million in annual revenue, which he believes would contaminate his "natural experiment." Williams Report ¶116.

224. *Id.* ¶112. Dr. Williams' DID regressions also include fixed effects by month. *Id.*

225. For example, suppose there are only two "products," the first in the "treatment group" and the second in the "control group," and suppose each is initially priced at $5. If price of the first product drops to $4 in January 2018 and the price of the second product remains the same, the DID regression will measure this as pass-through. If the prices of both products fall by the same amount, the DID regression will measure zero pass-through. If the price of the second product rises relative to the first product, the DID regression will also measure this as pass-through.

226. Williams Report ¶117, n. 146.

227. *Id.*

he purports to analyze during his "treatment period."

111. Dr. Williams, like Dr. Burtis, ignores all long-run effects of lower take rates by construction: Although Dr. William's "treatment period" technically runs for 42 months, the vast majority of his data set disappears within the first four to six months of the "treatment period."[228]

B. Neither Dr. Burtis Nor Williams Can Reliably Measure Pass-Through In A More Competitive But-For World With Substantially And Permanently Lower Take Rates for All or Almost All Developers

112. The pass-through analyses presented by Drs. Burtis and Williams cannot capture the long-run effect of permanently lower take rates for all or almost all developers flowing from increased competition. In a competitive world with more than one app store or payment processor, developers would be incentivized to pass on savings from a lower take rate via steering and discounting, to induce consumers to switch to the low-cost provider. In a competitive but-for world, this would be facilitated by (1) multi-homing and steering among competing app stores in the Android App Distribution Market; and (2) consumer (or developer) choice of payment processors with steering in the In-App Aftermarket.[229] This incentive is completely absent in the pass-through analyses of Drs. Burtis and Williams. Developers that enjoyed Google's take-rate decreases did not have to share any of the savings with their customers in order to realize the cost savings.

113. Drs. Burtis and Williams thus mistakenly attempt to study pass-through independently of the competitive mechanism that would engender lower take rates and thus motivate pass-through in the first place. In the competitive but-for world, there would be robust competition in both the Android App Distribution Market and in the In-App Aftermarket. This competition—with steering by developers driving take rate reductions—is completely absent in the pass-through analyses presented by Drs. Burtis and Williams, both of whom rely on narrow and artificial take-rate changes imposed by Google.

114. Rather than measuring pass-through, Drs. Burtis and Williams instead provide compelling evidence of price "stickiness."[230] For example, Dr. Burtis finds that [redacted] of the products she examined "exhibited no change in price at all during the class period."[231] This does not demonstrate that prices would have remained the same in a more competitive but-for world.

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228. *See* Figures 6-7, *infra*.
229. Singer Report ¶¶169-175; ¶¶229-232.
230. Dr. Burtis herself emphasizes price stickiness. Burtis Report ¶¶25-26; ¶151; ¶327.
231. *Id.* ¶175. *See also* Williams Report ¶¶80-81; Figure 3.

What it does demonstrate is that developer pricing exhibits stickiness, which arises due to well-understood behavioral economic phenomena such as consumer anchoring.[232]

115. As explained in the Singer Report, price stickiness would facilitate lower prices in the but-for world.[233] When a new App (or a new form of In-App Content) is developed, a profit-maximizing developer selects a price that maximizes expected profit over the long run, taking into account costs incurred over the long run.[234] To ensure a sufficient rate of return on its investment, a developer faced with the prospect of paying 30 percent of its revenue to Google in perpetuity will (all else equal) need to charge a higher price to consumers than a developer facing a lower take rate. Price stickiness implies that the initial price chosen for an App (or In-App Content) will influence subsequent pricing, and hence reinforces developers' incentives to select an initial price that takes all costs (including the take rate) into account. Because developer costs would have been permanently and substantially lower due to lower take rates, prices would have been permanently and substantially lower for all or almost all developers.[235] Thus, lower take rates would influence developer pricing from the inception of their Apps (or In-App Content). The pass-through analyses of Drs. Burtis and Williams are incapable of measuring this effect.

C. Drs. Burtis and Williams Do Not Follow Standard Econometric or Statistical Methods

116. The pass-through analyses of Drs. Burtis and Dr. Williams do not follow standard econometric or statistical methods. As Dr. Burtis concedes, her pass-through analysis does not control for "economic factors."[236] Indeed, Dr. Burtis does not employ any econometric methods or statistical tests when conducting her pass-through analysis.[237] Dr. Burtis includes no control variables, nor any control group at all her analysis—because the Challenged Conduct is always present in the actual world, she does not (and cannot) observe the prices that would have prevailed in the absence of the Challenged Conduct. This implies that Dr. Burtis's analysis "has little to say about causation."[238] According to standard economic principles, a "before-after" study must

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232. *See, e.g.,* Amos Tversky & Daniel Kahneman, *Judgment under Uncertainty: Heuristics and Biases*, 184 SCIENCE 1124, 1128 (1974) ("In many situations, people make estimates by starting from an initial value that is adjusted to yield the final answer…different starting points yield different estimates, which are biased toward the initial values. We call this phenomenon anchoring."). *See also*, Andrea Caceres-Santamaria, *The Anchoring Effect*, Federal Reserve Bank of St. Louis (2021), *available at* https://research.stlouisfed.org/publications/page1-econ/2021/04/01/the-anchoring-effect ("[I]t's the initial price a consumer is exposed to that becomes a consistent reference point when shopping around. The tendency for a person to rely heavily on the first piece of information they receive when making decisions is known as the anchoring effect…Anchoring plays a role in decisions that involve numerical values such as prices…Retailers are very aware that price anchors are an effective tool they can use in their pricing strategy.").

233. Singer Report ¶¶226-227.

234. *Id*. ¶226.

235. Even if one assumes that some developers would not lower their prices in the competitive but-for world, consumers still would benefit from quality improvements in Apps and In-App Content that developers would be able finance due to lower costs from lower take rates. Standard economics shows that competition drives firms to make competitive investments in product quality to keep pace with rivals. *Id*. ¶233 (citing Department of Justice & Federal Trade Commission, *Horizontal Merger Guidelines* (2010), §10).

236. Burtis Report ¶177.

237. For example, Dr. Burtis employs no econometric methods or statistical tests in Table 5, Exhibit 35, Exhibit 50, or Exhibit 55.

238. David Kaye & David Freedman, *Reference Guide on Statistics*, in REFERENCE MANUAL ON SCIENTIFIC EVIDENCE (Federal Judicial Center 2000), at 95.

include a clean "after" period in which the conduct in question is absent.[239] Dr. Burtis lacks a clean "after" period, which invalidates her pass-through analysis.[240]

117. Drs. Burtis and Williams violate the most fundamental assumption of any natural experiment—that the control group is *unaffected* by the policy change at issue.[241] Both ignore the elementary economic fact that a developer does not set prices for one product independently of other products sold by the same developer.[242] For example, Dr. Williams includes [redacted] "subscription products" in both his control group and his treatment group. More generally, [redacted] percent of the expenditures in Dr. Williams's "treatment group" are on Apps that also appear in Dr. Williams's "control group." In the case of Dr. Burtis (who has no control group nor any econometric control variables), 100 percent of the Apps in Dr. Burtis's after period also appear in the before period. Dr. Burtis has no way of controlling for factors, such as price stickiness, that will influence pricing in both time periods. Nor can Dr. Williams control for price stickiness, which will prevent prices in the "treatment group" from diverging from those in the "control group."

118. Relatedly, Drs. Burtis and Williams also ignore that competition among developers makes their pricing interdependent, which further contaminates their pass-through analysis. To illustrate, suppose there are two competing subscription developers and one is in Dr. Williams's "control group" and the other is in his "treatment group." If the developer in the "treatment group" drops its price, the developer in the "control group" will likely do the same. But this will register as zero pass-through in Dr. Williams's DID regressions, which picks up pass-through only when prices in the "treatment group" fall relative to the "control group." Conversely, if the developer in the "control group" does not drop its price (because its take rate is still 30 percent), the developer in the "treatment group" faces a diminished incentive to drop its own price.

D. Drs. Burtis and Williams Ignore the Elementary Economics of Subscription Pricing, Which Incentivizes Introductory Discounts at the Front End

119. Drs. Burtis and Williams both attempt to analyze the Play Store's 2018 take rate reduction for subscription developers, which applied only to customers with a subscription in place

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239. *See, e.g.,* Justin McCrary & Daniel Rubinfeld, *Measuring Benchmark Damages in Antitrust Litigation* 3(1) JOURNAL OF ECONOMETRIC METHODS 63 (2014) ("the benchmark approach evaluates prices only in the market at issue, comparing prices in the impact period to available prices before and/or after the alleged period of impact (the 'control period')").

240. Dr. Williams also lacks a clean "after" period.

241. *See, e.g.,* JEFFREY WOOLDRIDGE, INTRODUCTORY ECONOMETRICS: A MODERN APPROACH, at 453 (THOMPSON 4TH ED. 2009) ("A natural experiment occurs when some exogenous event—often a change in government policy—changes the environment in which individuals, families, firms, or cities operate. A natural experiment always has a control group, which is not affected by the policy change, and a treatment group, which is thought to be affected by the policy change.")

242. This form of pricing interdependence forms the economic basis for merger analysis. *See* Department of Justice & Federal Trade Commission, *Horizontal Merger Guidelines* (2010), §1. *See also* Steven Berry, *Estimating Discrete Choice Models of Product Differentiation* 25(2) RAND JOURNAL OF ECONOMICS 242–262 (1994); Gregory Werden & Luke Froeb, *The Antitrust Logit Model For Predicting Unilateral Competitive Effects* 70 ANTITRUST LAW JOURNAL 257 (2002); Aviv Nevo, *Mergers with Differentiated Products: the Case of the Ready-to-Eat Cereal Industry*, 31(3) RAND JOURNAL OF ECONOMICS 395-421 (2000).

for twelve continuous months.[243] Both ignore elementary economics, which shows that a subscription developer will tend to find it optimal to charge lower introductory prices, targeting a pool of relatively price-sensitive customers, and higher prices to loyal subscribers that have revealed a greater willingness to pay for the subscription service.[244] This explains why it is common for consumers to receive subscription offers with low *introductory* rates, which are eventually phased out—frequently after one year.[245] It therefore makes little economic sense for Drs. Burtis and Williams to assume that pass-through can be reliably measured based on "back-end" discounts offered to subscription developers' least price-sensitive consumers.

120. The anomalous manner in which take rates were reduced to subscription developers (only for customers maintaining a subscription for twelve continuous months) undermines another fundamental economic incentive for pass-through: The ability to attract new customers with a lower price, thereby offsetting the revenue losses on existing customers. This key incentive is absent in the actual world, but it would exist in a competitive but-for world with lower take rates across the board.

121. Drs. Williams and Burtis also ignore that, if a consumer has subscribed to a product for a year (or more) and paid the same monthly price, that consumer has revealed a strong willingness to pay for the subscription offering. It would make little economic sense for a developer to target price cuts to its least price-sensitive customers. Yet Drs. Burtis and Williams naively assume that pass-through would occur in exactly this way.

E. Drs. Burtis and Williams Ignore That the Play Store's Developer Interface Likely Made It Difficult or Impossible for Most Developers to Violate the Elementary Economics of Subscription Pricing by Forcing Back-End Discounts

122. Drs. Burtis and Williams ignore that the pricing rules in the Play Store's developer interface likely made it difficult or impossible for most developers to drop prices to subscribers after the first year. According to Google's developer pricing rules, subscription Apps may offer discounts to *new* subscribers.[246] But apart from these introductory discounts, I understand that

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243. Burtis Report ¶174, n. 193 ("In 2018, Google reduced the service fee rate on subscription IAPs when the consumer's subscription extended beyond a year.").

244. Standard economics shows that, when feasible, firms can earn more profit when the charge different prices to different groups of customers based on their willingness to pay. *See, e.g.,* DENNIS CARLTON & JEFFREY PERLOFF, MODERN INDUSTRIAL ORGANIZATION (Pearson 4th ed. 2005), Chapter 9.

245. *See, e.g.,* Subscribe, THE WALL STREET JOURNAL, *available at* https://store.wsj.com/shop/us/; *see also* https://www.nytimes.com/subscription ("Save 50% for one year. You can cancel anytime.").

246. *See* Play Console Help, *Create a subscription*, *available at* https://support.google.com/googleplay/android-developer/answer/140504?hl=en#zippy=%2Csubscription-prices%2Cintroductory-prices%2Cprice-changes ("5…**Introductory price**: You can offer new subscribers a discounted price for a specific duration. If you do, this must be within the accepted price range and cost less per day than the original price…With introductory pricing, you can

Google's developer interface makes it difficult or impossible for most developers to lower the price to *existing* subscribers after the first twelve months of their subscription without lowering the price to newer subscribers as well.[247] [redacted][248] In other words, based on the evidence available at this time, it does not appear that Google's developer-pricing interface or published policies provide a mechanism to implement the form of pass-through contemplated by Dr. Williams's "natural experiment" or by Dr. Burtis's "before-after" analysis of subscription developers. This complication would not arise in a competitive but-for world, given that take rates would be substantially and permanently lower for all or almost all subscribers.

F. Drs. Burtis and Williams Ignore the Vast Majority of Revenues for Subscription Developers Subject to Google's 2018 Take Rate Adjustment, and Rely on Artificially Defined "Products"

123. Dr. Williams claims that his DID regression compares the prices of different "subscription products."[249] To limit his "treatment group" to "products" with take rates of exactly 15 percent after 2017,[250] however, Dr. Williams generates an artificially large number of subcategories, and then selects only a handful of these subcategories to use in his "treatment group." He selects his subcategories based on "Product IDs," which do not correspond to product offerings as they are actually presented to customers. Similarly, for purposes of analyzing "Google Play's 2018 service fee reduction for certain subscriptions,"[251] Dr. Burtis limits her analysis of subscription developers to only those "SKUs for which the monthly service fee rate for that SKU fell to [redacted] or lower and remained at that level for at least three consecutive months."[252] In the process, both ignore the vast majority of revenue for these developers.

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specify an initial price that applies to a set number of days, weeks, months, or billing periods. For example, you can offer a subscription for $1 per month for the first three months. Or, you can offer an introductory price of $1 for 10 days, followed by a regular monthly price. At the end of the introductory period, users are charged the full subscription price…Introductory prices must be within the accepted price range and less than the subscription's full price. If you're offering a free trial and introductory price, your users are charged the introductory price at the end of the trial. A user can only receive an introductory price to a specific subscription product (SKU) one time. If the introductory period is a different length of time than the subscription period, the introductory price must cost less per day than the original price. For example, if a subscription costs $15 per month (or $0.50 per day), a week-long introductory price must cost less than $3.50. For these calculations, a month is always considered to be 30 days.") (emphasis in original).

247. Google's published policy generally does not allow developers to provide discounts to any subset of customers on a specific subscription product with the exception of introductory discounts. *See* Android Developers, Google Play, Play Billing, Sell Subscriptions, *available at* https://developer.android.com/google/play/billing/subscriptions

248. [redacted]

249. Williams Report ¶96.

250. *Id*. ¶117, n. 146.

251. Burtis Report ¶174.

252. *Id*. n. 193.

124. To restrict his "natural experiment" to what he terms "clean effects of the treatment," Dr. Williams discards all "products" from his "treatment group" that do not have take rates of exactly 15 percent after 2017, as well as all "products" in the "control group" that do not have take rates of exactly 30 percent.[253] In doing so, Dr. Williams generates artificial "products" that are divorced from economic reality. For example, if Dr. Williams's regression data set is to be believed, [redacted], which has just three major subscription categories ([redacted]), offers over [redacted] distinct "subscription products." To conform to his exacting 30-to-15 requirement, Dr. Williams's regression model uses only [redacted] of these "products." As shown in Table 1 below, Dr. Williams discards from his "treatment group" more than [redacted] percent of consumer expenditures on [redacted] during his "treatment period."

125. More generally, Table 3 shows that consumer expenditures on the "products" in Dr. Williams's "treatment group" constitute a trivial fraction (just [redacted] percent) of consumer expenditures for the developers (and their Apps) that Dr. Williams purports to analyze during his "treatment period."

TABLE 3: DR. WILLIAMS'S "TREATMENT GROUP" INCLUDES ONLY A SMALL FRACTION OF REVENUE FOR THE DEVELOPERS HE PURPORTS TO ANALYZE DURING HIS "TREATMENT PERIOD"

App	Consumer Spend in "Treatment Group"	Total Consumer Spend in App During "Treatment Period"	Percent In Treatment Group Regression
[redacted]			
All Others	[redacted]		
TOTAL			

126. Dr. Burtis, like Dr. Williams, relies on artificially defined "products" extracted from the Play Store's data production to conduct her pass-through analysis. For example, in Table 5 of the Burtis Report, Dr. Burtis claims that [redacted] percent of "subscription developers" showed evidence of pass-through one month after the take rate was reduced.[254] But the subscription "products" that Dr. Burtis analyzes in Table 5 represent [redacted] percent of the revenue for the Apps

253. Williams Report ¶117, n. 146.

254. Setting aside all of the other flaws in Dr. Burtis's analysis, it is doubtful whether one would expect to observe pass-through over such a short time horizon. A one-month adjustment period bears no relation to the competitive but-for world.

she purports to analyze.[255] Similarly, in Exhibit 50, Dr. Burtis claims that [redacted] percent of "subscription developers" showed evidence of pass-through within six months after the take rate was reduced. The subscription "products" that Dr. Burtis analyzes in Exhibit 50 represent [redacted] percent of the revenue for the Apps she purports to analyze.[256] It makes no economic sense for Drs. Williams and Burtis to assume that pass-through can be reliably measured by searching for price cuts to artificially constructed products that make up only a trivial fraction of developer revenue.

127. Because Dr. Williams's "products" are artificially constructed, their quantities sold fluctuate wildly and rapidly disappear over the course of Dr. Williams's "treatment period." Figure 4 below plots the number of monthly [redacted] transactions used in Dr. William's regression, as well as the subset of those transactions classified into Dr. Williams's "treatment group." As seen below, the total number of [redacted] transactions in Dr. Williams's regression (seen in the blue line) declines steeply soon after January 2018. The number of [redacted] "products" classified into Dr. Williams's "treatment group" (seen in the orange line) is tiny, never exceeding [redacted] transactions in a month, and falling to just [redacted] monthly transactions by the end of the "treatment period." It makes no economic sense for Dr. Williams to assume, as he does, that pass-through can be reliably measured by searching for price cuts among this minuscule subset of transactions.

255. See Appendix 2, Table A1.
256. See Appendix 2, Table A2.

128. Similarly, Figure 5 below displays the aggregate number of monthly transactions for the [redacted] "products" used in Dr. Burtis's pass-through analysis. As before, the volume for these artificially defined "products" fluctuates wildly. These "products" amount to at most [redacted] percent of [redacted] revenue in the Play Store over the (one to six month) timeframe when Dr. Burtis searches for pass-through.[257] It is not reasonable to assume, as Dr. Burtis does, that artificially constructed "products" such as these would drive the pricing decisions of a developer such as [redacted]r.

257. See Appendix 2, Tables A1-A2.

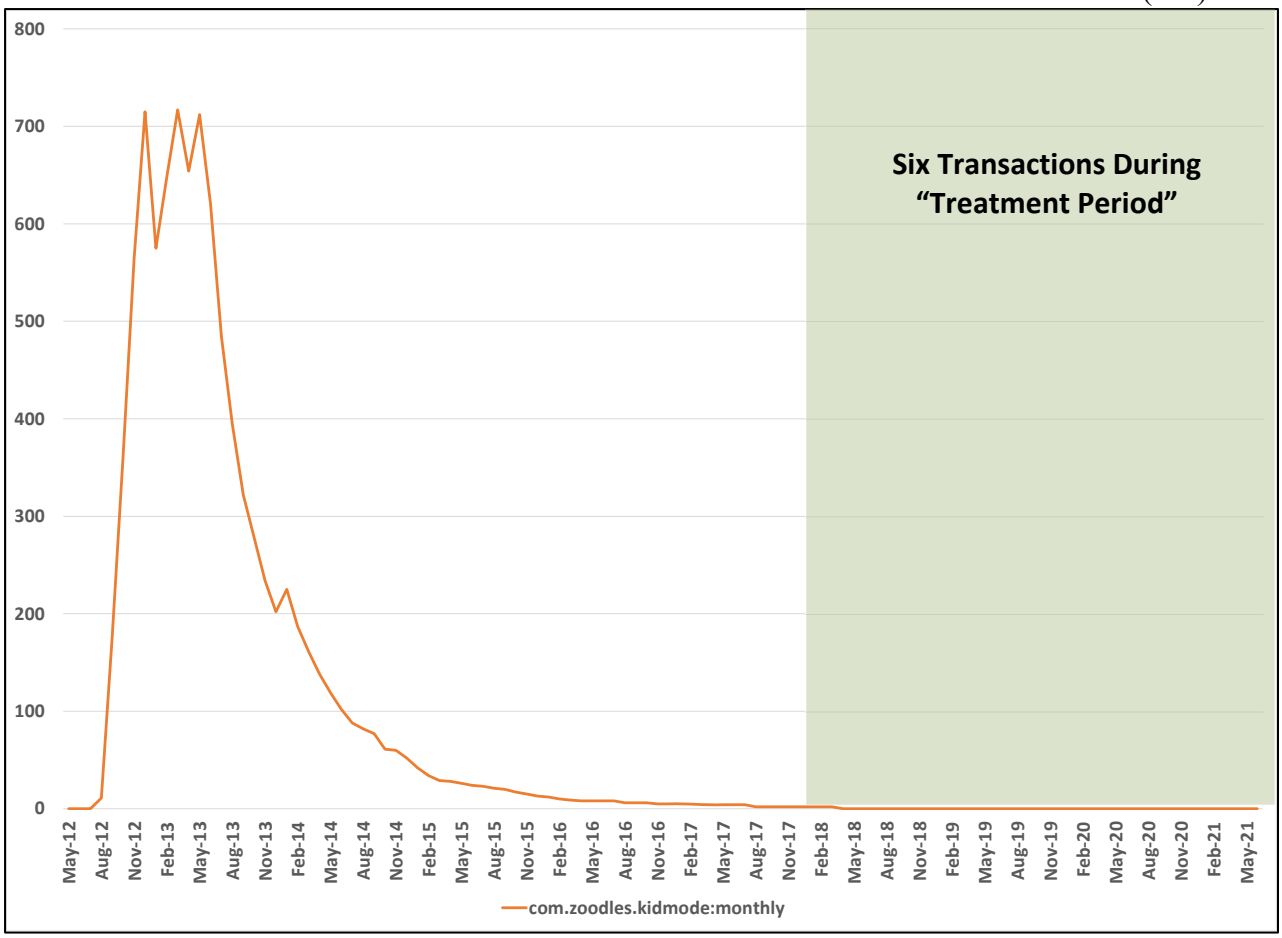
129. Figure 6 below displays the aggregate number of monthly transactions for all of the "products" used in Dr. Williams's regression. As seen below, the total number of transactions in Dr. Williams's regression (seen in the blue line) declines steeply from its peak in early 2018. The number of "products" classified into Dr. Williams's "treatment group" (seen in the orange line) begins as a small fraction of the blue line, and also falls off steadily. As before, Dr. Williams assumes incorrectly that pass-through can be reliably measured by searching for price cuts among this minuscule subset of transactions. The data underlying his regression model is divorced from economic reality.

130. The "products" in Dr. Williams's "treatment group" appear only intermittently and with extremely small transaction volumes. During the 42 months of Dr. Williams's "treatment period," from January 2018 through June 2021, the average "product" in the "treatment group" has fewer than five transactions per month. The average "product" also has zero transactions in 31 of the 42 months in Dr. William's "treatment period."[258]

131. The median "product" in Dr. Williams's "treatment group" has just six *total* transactions for *all* 42 months of the "treatment period." Put differently, half of the "products" in Dr. Williams's "treatment group" have six or fewer transactions during the entirety of the "treatment period." Figure 7 below plots the monthly transactions for one such "product." As seen below, this offering had been largely removed from the market before Dr. Williams's "treatment period" had even begun. During the "treatment period," a grand total of six transactions are recorded (two each in January, February, and March of 2018) before the transaction volume drops to zero and stays there.

258. Even if one were to ignore all months in which a purported "product" had zero transactions, the average "product" would still have only 20 transactions per month.

FIGURE 7: MONTHLY TRANSACTIONS FOR A "PRODUCT" IN THE "TREATMENT GROUP" WITH THE MEDIAN NUMBER OF TRANSACTIONS DURING THE "TREATMENT PERIOD" (SIX)



132. Similar to Dr. Williams's analysis, the "products" in Dr. Burtis's analysis of subscription developers subject to the Play Store's 2018 take-rate adjustment exhibit instability and appear only intermittently. The median subscription "product" in Dr. Burtis's pass-through analysis had just 22 *total* transactions during the six-month period that she examined. In other words, half of the subscription "products" in Dr. Burtis's pass-through analysis had fewer than 3.7 transactions per month.[259] It makes no economic sense to assume, as Drs. Burtis and Williams do, that artificially constructed products with a *de minimis* number of transactions, and accounting for just a small fraction of developer revenue, would drive developer pricing decisions in response to lower take rates.

133. Because their "subscription products" are a tiny and artificially constructed sliver of the actual products offered by subscription developers, the "subscription products" analyzed by Drs. Burtis and Williams are likely not a representative sample. A representative sample is "a sample judged to fairly represent the population, or a sample drawn by a process likely to give samples that

259. Equal to 22 divided by 6.

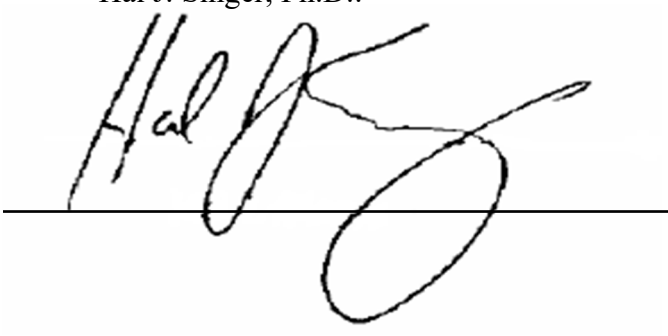
fairly represent the population, for example, a large probability sample."[260] As explained above, the subscription "products" analyzed by Drs. Burtis and Williams are defined artificially, constitute a small share of developer revenue, and appear intermittently and in very small (sometimes zero) transaction volumes. The population that the sample is purported to represent should, at a minimum, consist of stable subscription product offerings likely to drive developer pricing decisions.

CONCLUSION

134. For the reasons given above, the opinions that I offered in the Singer Report remain unaltered.

* * *

Hal J. Singer, Ph.D.:



Executed on April 25, 2021.

260. David Kaye & David Freedman, *Reference Guide on Statistics*, REFERENCE MANUAL ON SCIENTIFIC EVIDENCE 295 (3rd ed. National Academies Press 2011).

APPENDIX 1: MATERIALS RELIED UPON

BATES DOCUMENTS

AMZ-GP_00003257

GOOG-PLAY-000005203.R

GOOG-PLAY-000076766

GOOG-PLAY-000076773

GOOG-PLAY-000292207.R

GOOG-PLAY-000294117.R

GOOG-PLAY-000297309.R

GOOG-PLAY-000303918.R

GOOG-PLAY-000336574

GOOG-PLAY-000355570.R

GOOG-PLAY-000416245

GOOG-PLAY-000443763

GOOG-PLAY-000560564

GOOG-PLAY-000568027

GOOG-PLAY-000579868.R

GOOG-PLAY-001501104

GOOG-PLAY-001507837

GOOG-PLAY-001556407

GOOG-PLAY-002414772

GOOG-PLAY-003605103

GOOG-PLAY-006990552

GOOG-PLAY-007203251

GOOG-PLAY-007346993

GOOG-PLAY-007745829

GOOG-PLAY-007879368.C

GOOG-PLAY-007887261

GOOG-PLAY-008162331

GOOG-PLAY4-007109523

GP MDL-TMO-0002416

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Expert Report of Dr. Michelle M. Burtis (March 31, 2022)

Expert Report of Hal J. Singer, Ph.D. (February 28, 2022)

Expert Report of Michael Williams (February 28, 2022)

APPENDIX 2: ADDITIONAL TABLES AND FIGURES

APPENDIX TABLE A1: THE "SUBSCRIPTION DEVELOPERS" IN DR. BURTIS'S TABLE 5 REPRESENT ONLY A SMALL PROPORTION OF REVENUE FOR THE DEVELOPERS SHE PURPORTS TO ANALYZE

App	Consumer Spend in Burtis's Table 5	App Total Consumer Spend One Month After Service Fee Rate Drop	Percent of Consumer Spend in Burtis's Table 5
[redacted]			
All Others			
TOTAL			

APPENDIX TABLE A2: THE "SUBSCRIPTION DEVELOPERS" IN DR. BURTIS'S EXHIBIT 50 REPRESENT ONLY A SMALL PROPORTION OF REVENUE FOR THE DEVELOPERS SHE PURPORTS TO ANALYZE

App	Consumer Spend in Burtis's Exhibit 50	App Total Consumer Spend Six Months After Service Fee Rate Drop	Percent of Consumer Spend in Burtis's Exhibit 50
[redacted]			
All Others			
TOTAL